AMERICAN GAS ASSOCIATION MONTHLY

JUNE · 1934

WHOSE Cooking Costs SHALL BE CUT NEXT?

Special new kitchen-cost survey by gas companies is saving money and improving service in countless kitchens

THE COUNTRY OVER, gas companies are walking into kitchens like yours—run by men like yourself who have made every saving they could find these past few years—and coming out to lay before the operators *specific* suggestions for bringing cooking costs lower yet. With actual *gains* in cooking service, too.

How?——By applying the many ingenious new ways that gas research has uncovered to make gas a better, thriftier fuel than ever.

Now, what about your cooking costs?

Why not make this new check-up in your kitchen? Your gas company offers it now. *Free.* They will send along a gas cost engineer who knows before he starts at least seven points where cooking costs have been cut in other kitchens.

Let him check *your* equipment against *your* needs in *your* kitchen. Let him tell you exactly how you can make the world's finest fuel give you finer service than ever.

Pick up your 'phone and ask for him *now!*

RIGHT NOW, *for instance, your Bain maries and fry kettles could save frying oil, save gas, save chefs' time—and still turn out better food!*

modern GAS *service*

cooks it better—for less

HOTEL AND RESTAURANT COMMITTEE OF THE

AMERICAN GAS ASSOCIATION

Second of a series of advertisements prepared by the Hotel and Restaurant Committee, Industrial Gas Section, American Gas Association as it will appear in hotel and restaurant trade papers.

AMERICAN GAS ASSOCIATION MONTHLY

Contents for June 1934

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Here is shown the Mess Hall, United States Military Academy, West Point, N. Y., where gas-fired cooking equipment replaced coal and charcoal appliances. Since the gas installation in the Mess Hall kitchen, a new hospital and barracks kitchen have been similarly equipped. For details see page 213.

AMERICAN GAS
ASSOCIATION
MONTHLY

Allyn B. Tunis, Editor

Eyes of Industry Begin To Focus On Atlantic City

ATLANTIC CITY again beckons the Gas Fraternity. The Municipal Auditorium on the celebrated Boardwalk of the famous New Jersey resort will be the scene of the Sixteenth Annual Convention and Exhibition the week of October 29, and the occasion promises to be a conspicuous one in the annals of the industry.

The exhibit of gas equipment and appliances will be the first held in connection with the Convention in three years and unusual interest centers about the restoration of that instructive feature, which always is an attraction to representatives of all branches of the industry.

Manufacturers of appliances and equipment have not been slow to recognize the extraordinary value which attaches to this year's exhibition. This will be the first of its kind since 1931, and all are eager to display their domestic and industrial appliances which have been remarkably developed and improved since the last national "Gas Show."

Nearly all exhibit space has been allotted, and the individual displays promise a complete exhibition of everything that's new in ranges, water heaters, house heating plants, refrigerators, air conditioning units, laundry equipment, accessories of all kinds, in addition to the latest equipment for distribution systems, plant and office, all designed for the more efficient use of gas.

Engineers, commercial men, accountants, home service workers, in fact, all identified with the industry are just as eager to see the latest things as the manufacturers are to show them.

Executives, heads of departments and others in company organization will make their contributions during the programs of General, Departmental and Sectional meetings. Generally, papers and discussions will deal with important national questions affecting the industry, and also with practical operating and sales subjects.

Details of the program will be furnished in ample time.

Atlantic City in the Autumn is a popular place. Crisp days on the Boardwalk not only are inviting but invigorating as well. But apart from the natural attractions the resort affords, those who will attend the Convention and Exhibition will receive the benefit of reduced round-trip railroad fares, and unusually reasonable hotel rates. Detailed information regarding railroad and hotel rates will be forwarded the membership in ample time for early reservations.

Manufacturers who have been assigned space at the Exhibition are as follows:

A-B Stove Co., Battle Creek, Michigan; Alcazar Range & Heater Co., Milwaukee, Wis.; Air Reduction Sales Co., New York, N. Y.; Alpha-Lux Co. Inc., New York, N. Y.; American Brass Co., Waterbury, Conn.; American Cast Iron Pipe Co., Birmingham, Ala.; American Gas Journal, New York, N. Y.; American Gas Products Corp., New York, N. Y.; American Meter Co., New York, N. Y.; American Stove Co., Cleveland, Ohio; American Thermometer Co., St. Louis, Mo.; Automatic Products Co., Milwaukee, Wis.

Bailey Meter Co., Cleveland, Ohio; Barber Gas Burner Co., Cleveland, Ohio; Bartlett Hayward Co., Baltimore, Md.; Blodgett Co. Inc., G. S., Burlington, Vt.; Bristol Co., Waterbury, Conn.; Bryant Heater Co., Cleveland, Ohio; Burdett Mfg. Co., Chicago, Ill.; Burroughs Adding Machine Co., Detroit, Mich.

Caloric Gas Stove Works, Philadelphia, Pa.; Carson Cadillac Corp., Birmingham, Ala.; Chace Valve Co., W. M., Detroit, Mich.; Chambers Corp., Shelbyville, Ind.; Chaplin-Fulton Mfg. Co., Pittsburgh, Pa.; Cleveland Gas Meter Co., Cleveland, Ohio; Cleveland Heater Co., Cleveland, Ohio; Cleveland Trencher Co., Cleveland, Ohio; Clow & Sons, James B., Chicago, Ill.; Connelly Iron Sponge

Governor Co., Elizabeth, N. J.; Crane Co., Chicago, Ill.; Cribben & Sexton Co., Chicago, Ill.; Cruse-Kemper Co., Ambler, Pa.; Cutler-Hammer Inc., Milwaukee, Wis.

Dearborn Chemical Co., Chicago, Ill.; Detroit Lubricator Co., Detroit, Mich.; Detroit-Michigan Stove Co., Detroit, Mich.; Dresser Mfg. Co., S. R., Bradford, Pa.

Economy Governor Co., Anderson, Ind.; Electrolux Refrigerator Sales, Inc., New York, N. Y.; Estate Stove Co., Hamilton, Ohio.

Floyd-Wells Co., Royersford, Pa.; Foxboro Co., Foxboro, Mass.

Gas Purifying Materials Co. Inc., Long Island City, N. Y.; General Ceramics Co., New York, N. Y.; General Coal Co., Philadelphia, Pa.; General Electric Co., New York, N. Y.; General Gas Light Co., Kalamazoo, Mich.; Glenwood Range Co., Taunton, Mass.; Globe American Corp., Kokomo, Ind.

Handley Brown Heater Co., Jackson, Mich.; Harper Wyman Mfg. Co., Chicago, Ill.; Homestead Heater Co., Newark, N. J.

Improved Equipment-Russell Engineering Corp., New York, N. Y.; International Business Machines Corp., New York, N. Y.; International Nickel Co., Inc., New York, N. Y.

Johns-Manville, Inc., New York, N. Y.; Kitson Co., Philadelphia, Pa.

Lambert Meter Co., Brooklyn, N. Y.; Lattimer-Stevens Co., Columbus, Ohio; Lavino & Co., E. J., Philadelphia, Pa.; Littleford Bros., Cincinnati, Ohio; Lovekin Water Heater Co., Philadelphia, Pa.

Majestic Mfg. Co., St. Louis, Mo.; McWane Cast Iron Pipe Co., Birmingham, Ala.; Mettler Co., Lee B., Los Angeles, Calif.; Milwaukee Gas Specialty Co., Milwaukee, Wis.; Minneapolis-Honeywell Regulator Co., Minneapolis, Minn.; Moore Corp., Joliet, Ill.; Mueller Co., Decatur, Ill.; Mulcare Engineering Co. Inc., New York, N. Y.

National Superior Co., Toledo, Ohio; National Tube Co., Pittsburgh, Pa.

Patrol Valve Co., Cleveland, Ohio; Peerless Heater Co., Boyertown, Pa.; Peerless Mfg. Corp., Louisville, Ky.; Penn Electric Switch Co., Des Moines, Iowa; Pennsylvania Furnace & Iron Co., Warren, Pa.; Pittsburgh Coal Co., Pittsburgh, Pa.; Pittsburgh Equitable Meter Co., Pittsburgh, Pa.

Reynolds Gas Regulator Co., Anderson, Ind.; Robbins Publishing Co., New York, N. Y.; Roberts & Mander Stove Co., Philadelphia, Pa.; Roberts Brass Mfg. Co., Detroit, Mich.; Roberts-Gordon Appliance Corp., Buffalo, N. Y.; Robertshaw Thermostat Co., Youngwood, Pa.; Roper Corp., Geo. D., Rockford, Ill.; Ruud Manufacturing Co., Pittsburgh, Pa.

Safety Gas Main Stopper Co., Inc., Brooklyn, N. Y.; Sands Mfg. Co., Cleveland, Ohio; Semet-Solvay Engineering Corp., New York, N. Y.; Simplex Gas Products Corp., Philadelphia, Pa.; Skinner Co., M. B., South Bend, Ind.; Spencer Thermostat Co., Attleboro, Mass.; Sprague Meter Co., Bridgeport, Conn.; Stacey Bros. Gas Construction Co., New York, N. Y.; Standard Gas Equipment Corp., New York, N. Y.; Superior Meter Co., Brooklyn, N. Y.; Surface Combustion Corp., Toledo, Ohio.

Tappan Stove Co., Mansfield, Ohio; Therminsul Corporation of America, Kalamazoo, Mich.; Tinnerman Stove & Range Co., Cleveland, Ohio.

United American Bosch Corp., Springfield, Mass.; United Engineers & Constructors Inc., Philadelphia, Pa.; United States Pipe & Foundry Co., Burlington, N. J.

Wailes Dove-Hermiston Corp., New York, N. Y.; Welsbach Co., Gloucester, N. J.; Whitehead Metal Products Co. of N. Y., New York, N. Y.; Wood Mfg. Co., John, Conshohocken, Pa.; Wilcolator Co., Newark, New Jersey; Wood & Co., R. D., Philadelphia, Pa.

Youngstown Sheet & Tube Co., Youngstown, Ohio.

Burnham Boiler Corp., Irvington, N. Y.; Cleveland Co-Operative Stove Co., Cleveland, O.; Mears Kane, Ofeldt, Inc., Philadelphia, Pa.; Natural Gas Magazine, Cincinnati, O.; Public Utilities Reports, Washington, D. C.; H. A. Thrush & Co., Peru, Ind.

American Gas Journal Is 75 Years Old

CONGRATULATIONS to the "American Gas Journal" upon its Seventy-fifth Anniversary Number, published last month.

Just three-quarters of a century ago—the early summer of 1859—this publication, then known as the "American Gas Light Journal," made its bow to the gas industry. Through the years it has occupied an enviable position and its readers are prepared to testify as to their appreciation of this trade paper's value in its month-to-month presentation of current topics, technical papers and other items of interest to the industry.

Embraced within its 158 pages, the Anniversary Number offers contributions from well-known men which are certain to hold the interest of the gas fraternity—they will prove informative to the younger generation and recall memories of another day to the Old Guard.

In "Reminiscences," Alfred E. Forstall reviews changes and progress of the industry. J. Faber Hants has compiled an interesting study—"19th Century Natural Gas—A Chronology from the Files of the American Gas Journal." "The A.G.A. Family Tree," by Luis Hilt, librarian of the American Gas Association, sketches the background and history of the present organization. An outstanding feature of this article is a list of presidents, beginning with 1873, when Charles Roome was elected head of the American Gas Light Association.

"History and Development of the Gas Meter" by George Wehrle is an attractive presentation of this subject. Everyone will want to read "Three-Quarters of a Century of American Water Gas Progress," by John H. Wolfe, superintendent gas manufacturing, Consolidated Gas, Electric Light & Power Company, Baltimore, Md. Progress in gas analysis is reviewed by A. W. Joyce, Ph.D.

Gas engineers will be particularly absorbed by Herbert W. Alrich's article about "Gas Tanks Now and Then."

Besides the articles mentioned the special issue contains a variety of additional information about many phases of the industry. Most of the items are well-illustrated, the pictures of early equipment and appliances being unusually effective in adding to the general attractiveness of the issue.

Concluding his contribution to the special edition, R. S. McBride, consulting editor of the "Journal," writes: "When another quarter-century passes and 'American Gas Journal' has its Centenary Issue, it will be appropriate to discuss the history of adoption of the therm as a unit of gas supply."

"Gas for the Home" Theme At 1934 World's Fair

GAS for the home" is the theme of the Gas Industry Exhibit at the 1934 Chicago World's Fair. Sponsored by the American Gas Association, with member gas companies and appliance manufacturers cooperating, the display occupies the same space as used last year in the south wing of Home Planning Hall on Leif Ericksen drive at Twenty-eighth Street.

The Gas Industry Exhibit this year is in an ideal location since it is situated immediately north of the north end of the already famous Ford building, the latter being one of the most striking and spectacular exhibits on the exposition grounds.

Gas-Made Cookies

Visitors to Home Planning Hall last year will recall the U-shaped wing in the south end of the building, starting with the reception hall near the entrance. The reception hall, considerably changed over last year, is arrayed in pleasant, cheerful colors and a delicious odor of baking greets the visitors. Everyone is invited to have a cookie made with gas.

Passing south, out of the reception room, on the left the visitor finds a colorful array of the world's finest cooking equipment—modern gas ranges to delight the eye of the onlooker. Immediately in back of the ranges and running to the top of the high ceiling, are murals, all of them suggesting whetted appetites that go with the preparation of good meals.

Next come three kitchens. First there is the "colonial kitchen," then the "traditional kitchen," and as a setting for the modern gas range, the modern kitchen is located in the southeast corner of the exhibit. In back of the kitchens more murals vividly portray the kitchen idea.

Along the extreme south wall of the building the very latest and finest in home heating and water heating equipment are to be found. In the southwest corner of the exhibit is a de luxe basement. Modern and up-to-the-minute, this basement offers convincing proof of what gas equipment means in the modernization of the American home.

On the west side of the exhibit the visitor finds restful relaxation in a room specially designed for the comforts and convenience of the Fair tourists. Comfortable seats harmonize with pleasant surroundings, and on cold days when chilly winds suddenly blow in from Lake Michigan, circulating heaters provide cheerful warmth.

Graphic Demonstration

Just north of this resting place, on the west side of the building, are two modern basements; in one, a conversion burner, and in the other a regular complete gas designed burner. In between the two basements a graphic demonstration shows how the thermostat operates on an automatic storage water heater.

The outstanding feature of the entire exhibit is its simplicity of demonstrating, a fact that should make it one of genuine interest to every visitor, young and old, who will tour the Fair this summer.

Committee in Charge

The A. G. A. Committee on 1934 Exhibit at the World's Fair follows:

R. B. Harper, chairman, The Peoples Gas Light & Coke Co., Chicago; C. N. Chubb, American Light & Traction Co., Chicago; J. D. Creveling, Henry L. Doherty & Co., New York, N. Y.; Henry O. Loebell, Natural Gas Pipeline Co. of America, Chicago; T. V. Purcell, The Peoples Gas Light & Coke Co., Chicago; N. T. Sellman, Consolidated Gas Company of New York, and C. W. Berghorn, secretary, New York.

Baking Demonstration

Among other features, the magic of the modern bakery is being demonstrated at the Fair by the Continental Baking Company, which has taken over the building on Northerly Island occupied last year by the dairy industry. In this new exhibit the exact science of bread making is shown with automatically operated weighing, measuring and mixing machines, a feature of which is a gas fired travelling tray oven, with a capacity of 600 loaves of bread an hour.

Visitors see modern bread making from start to finish, from the ingredient room, where the weighing and measuring is done, through the mixing room, next fermentation, dough weighing, cutting and shaping, "raising" the dough in air-conditioned rooms, into the big oven, baked to a golden brown, cooled, sliced and wrapped for delivery.

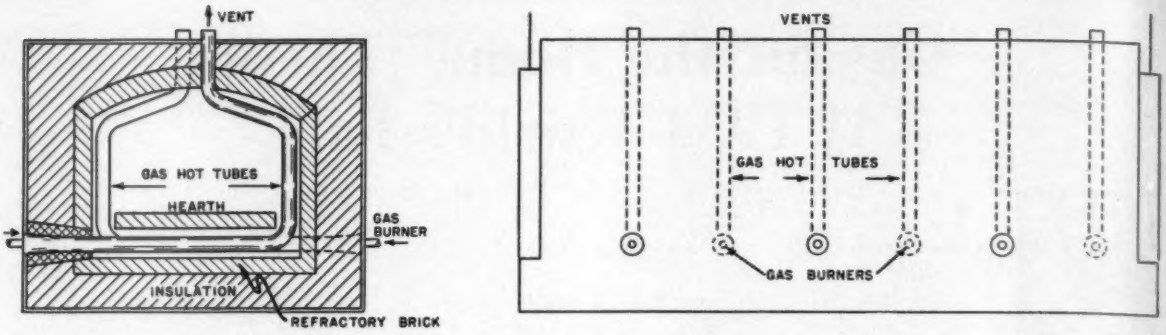
In the sampling room bread and jelly, cakes, cookies and tea rolls are served. Entertainment is furnished by a puppet show, featuring the "Happy Wonder Bakers," radio stars.

In addition to the big bake oven, the complete gas equipment includes a 10 horsepower steam boiler, two water heaters, ranges, percolators, toasters and cake ovens.

Arcturus Lights Gas Beacon at Fair

A new and different Arcturus ceremony takes place nightly this year at the World's Fair. Each evening light beams from the famous star Arcturus are captured to light a great torch of gas. On a tall pedestal appropriately placed in the Hall of Science Court, is a decorative beacon, which is lighted each evening at twilight.

Last year, it will be remembered. Arcturus lighted the Exposition every evening. Fair authories discovered that the lighting ceremony was not altogether satisfactory as the 1933 season advanced and so old reliable gas will be teamed up with Arcturus for this spectacular twilight ritual.



Application of gas hot tubes in type of installation where the furnace atmosphere and products of combustion must be kept separated

The Rise of "Gas Hot Tubes"

By EUGENE D. MILENER

Secretary, Committee on Industrial Gas Research

OVER a given period of time, there can always be noticed certain well-defined trends that affect engineering. Sometimes these trends are brought about by engineering developments alone but, on other occasions, they occur because economic conditions exert certain pressure on engineering. The rise of "Gas Hot Tubes" can be traced to an engineering trend that has been spurred on by economic pressure.

If we study the recent history of applying energy in manufacturing processes, it is clear that periodically smaller quantities of energy are made to do more useful work. That is true whether the energy is used in the form of power or heat.

In the case of power, as applied through electric motors, for example, we have seen the efficiency of the motor itself increase and its size and weight decrease; we have seen shafting and belting reduced or entirely eliminated; and we have seen roller and ball bearings installed in motors and in machines run by motors replace older and less efficient bearings.

In the case of heat, we have seen a similar train of events happen that have had the same effect, namely, more useful work with less energy. In heating operations, more scientific combustion has reduced the input of fuel; better furnace designs have reduced the input of fuel; more and better insulation and refractories have reduced the amount of fuel required; and further reductions in the quantities of fuel have been made by developing and applying more accurate temperature controls.

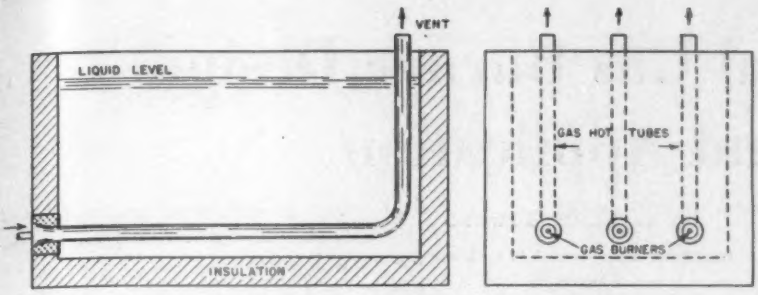
These and other steps when viewed in the aggregate have contributed toward speeding up countless manufacturing processes in factories. The effect on the fuel industries has been mixed. First, of course, is that for a given number of articles manufactured the total quantity of heat used is less than formerly. Second, the more refined fuels tend to displace the cruder fuels. Third, the fuel cost per article manufactured might be less with higher-priced refined fuel than with lower-priced crude fuel. Fourth, larger fields are gradually opened to the more refined fuels. Fifth, the way is frequently opened for major alterations and improvements in manufacturing procedure.

In the quest for ways to apply gas that will on the one hand meet competition and on the other hand broaden the opportunity for gas to undertake certain additional manufacturing responsibilities, "Gas Hot Tubes" are now being effectively used. "Gas Hot Tubes" is a designation that has been given to the wide variety of tubular forms which are heated by burning gas inside and utilizing the heat that is transferred through the walls of the tubes to heat liquids, soft metals or the atmospheres of industrial furnaces and ovens. "Gas Hot Tubes" are applicable wherever the products of combustion cannot be brought into direct contact with articles or liquids being heated.

One of the first applications of the hot tube principle was in connection with heating liquids and was known as immersion heating. In this application pipes or tubes of assorted lengths and sizes are placed in liquid or soft metal tanks and gas is burned inside them. A very rapid transfer of heat takes place through the walls of the tubes and the liquid is quickly heated, in much the manner that steam is generated in fire tube boilers. The other and more recent application of hot tubes is in connection with heating high temperature industrial furnaces. In these instances, hot tubes are placed along the walls and roof and under the hearth of furnaces and the heat radiated from them raises the temperature of the furnace to the desired point.

The use of immersion burners or "Gas Hot Tubes" in tanks, extends back farther than does their use for heating furnaces. Their superiority for this type of service was early recognized, and the principle employed can be said to represent the only real advance that has yet been made over the principle of simply building a fire under tanks or pots. Submerged combustion, another method of heating tanks where the gas is actually burned down in the liquid itself, represents a possibility for the future.

When "Gas Hot Tubes" are employed for heating liquids they can be either extended up beyond the surface of the liquid, in which case the burner is inserted in one end and the vent is formed by the other end. In other instances, the end of the tube is welded into the wall of the tank below the



Gas hot tubes applied to heating liquids in an open tank

surface of the liquid and the vent is carried to the top or through a similar welded opening in the wall at another point. Very ingenious alternative methods have been devised, some incorporating patented internal circulation within the tubes and patented burner and combustion methods.

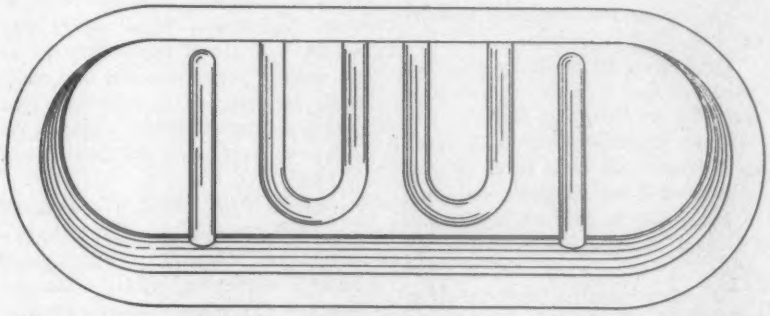
The recent application of "Gas Hot Tubes" to heating industrial furnaces is of particular interest because of the advances that industry has made in heating manufactured parts in synthetic atmospheres. With hot tube heating atmospheres containing pure air, or given quantities of any gases used for processing, can be employed to surround the parts being heated, the heat being furnished by radiation and conduction from the walls of the tubes.

There are many advantages to "Gas Hot Tubes" where they are applicable. They provide a simplified method of heating that replaces the expensive and frequently unsatisfactory refractory muffles. In many instances they can be used in place of metallic muffles or packing boxes.

Hot tubes afford an extremely flexible method of heating furnaces. They can be made practically any size and practically any shape to conform to the dimensions of the furnace. They can be made of rolled alloy steel or cast alloy steel. Sufficient total surface can be installed to raise the furnace temperature in any desired time.

Each "Gas Hot Tube" is usually heated individually by means of a burner. For low temperature work reliable methods have been worked out for using scientifically designed venturi in connection with atmospheric burners. For high temperature work, most any of the standard or special combustion systems can be utilized successfully. Future research work will probably result in a more even distribution of heat throughout the length of the tubes.

The application of "Gas Hot Tubes" to industrial furnace work was retarded somewhat because of the limitations imposed by materials of which tubes could be made. This was also true in connection with immersion burners when attempts were made to heat certain liquids and soft metals that chemically attacked the walls of the tubes.

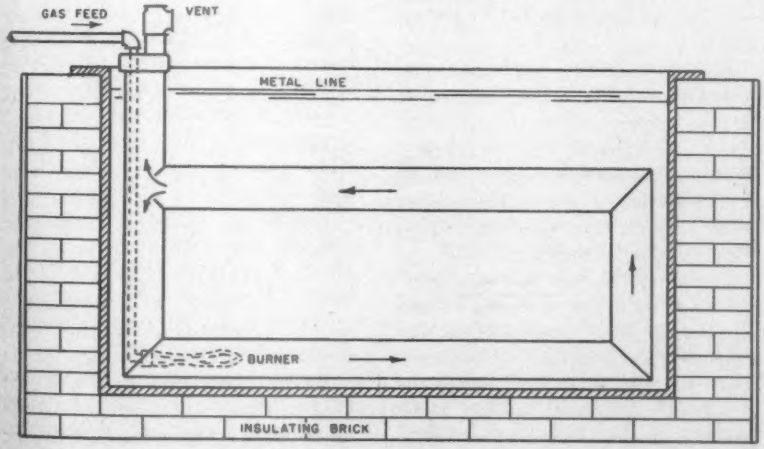


View over top of metal pot showing an application of gas hot tubes in conjunction with external heating

One of these limitations developed, for instance, during the attempts of the Committee on Industrial Gas Research to heat zinc base die casting metal by this method. The chemical action of the zinc reduced the life of the tubes so that early attempts were unsuccessful. Contrast this with similar pioneer work which the Committee sponsored in melting stereotype metal. There being no chemical reaction between this type of soft metal and the tubes, their life has been found to be practically unlimited.

Recent improvements in the heat resisting qualities of certain alloys of steel have opened the field for applying "Gas Hot Tubes" to industrial furnaces that operate at comparatively high temperatures. With no fear that tubes will rapidly deteriorate when heating furnaces up to 1600° or 1700°, the possibility of heating annealing

(Continued on page 219)



Gas hot tube of the recirculating type installed in a metal melting pot

Industrial Gas Burner Design And Application

By E. O. MATTOCKS

Industrial Engineer, A.G.A. Testing Laboratory

RECENT proof of the greater value for industrial processes of all kinds has prompted more careful attention to the design and use of industrial gas utilization equipment. As a result, much progress has lately been made in attaining a greater technical knowledge and a higher degree of development of industrial gas appliances and their component parts. It is felt that industry as a whole should be advised of the nature of such progress so that all might apply and profit from greater experience, and thereby assist in augmenting the benefits to industry of well-applied gas heat.

The burner, the device by means of which the fuel is burned and made to surrender its energy as heat, is obviously an important element in appliance design, and must be thoroughly understood if the equipment employed to utilize gas in industry is to reflect the level of engineering skill it deserves.

Too many industrial applications of gas are not sufficiently well designed to operate with the efficiency and in the manner that they could and should. In many instances the selection and use of burners is at fault, a matter easily and inexpensively corrected when the principles of design and application of industrial gas burners are properly considered.

It is the purpose, therefore, of this paper to survey in outline the field of industrial gas burner design and application with a view to (1) indicating representative types and uses of refined burners and burner systems and (2) presenting certain fundamental design data revealed in the course of researches sponsored by the Committee on Industrial Gas Research of the American Gas Association.

With the assistance of information presented herein progress in the solution of average industrial burner problems may be aided considerably and directed into profitable channels. It must be constantly remembered, however, that burner requirements vary widely and that if best results are to be secured, meticulous care and study must be exercised to select the type and application of burner suited to the particular installation and heating task at hand.

Industrial gas burners fall naturally into three distinct classifications: (1) atmospheric burners,* (2) pressure burners employing premixed air and gas, and (3) pressure burners employing nozzle-mixing of air and gas.

Atmospheric burners consume mixtures of gas and primary air, but require secondary air supplied around the flame for complete combustion. The primary air (that air mixed with the gas prior to ignition) is, in such burners, inspirated into a jet of gas by virtue of its momentum, and the mixture supplied to the burner port or ports.

Pressure burners employing premixed air and gas, in the main, utilize mixtures of gas and all the air necessary for complete combustion, i.e., they usually require no secondary air, all the necessary air being available as primary. However, slight secondary air injection is occasionally afforded.

Pressure burners employing nozzle-mixing of air and gas generally require no primary air. Air and gas are supplied through separate ports (usually adjacent) and mix only during the combustion process by agitation or by diffusion in the combustion chamber. Since the design and application of each of these three general types of burners are different, they will be dealt with separately.

Design Data Available

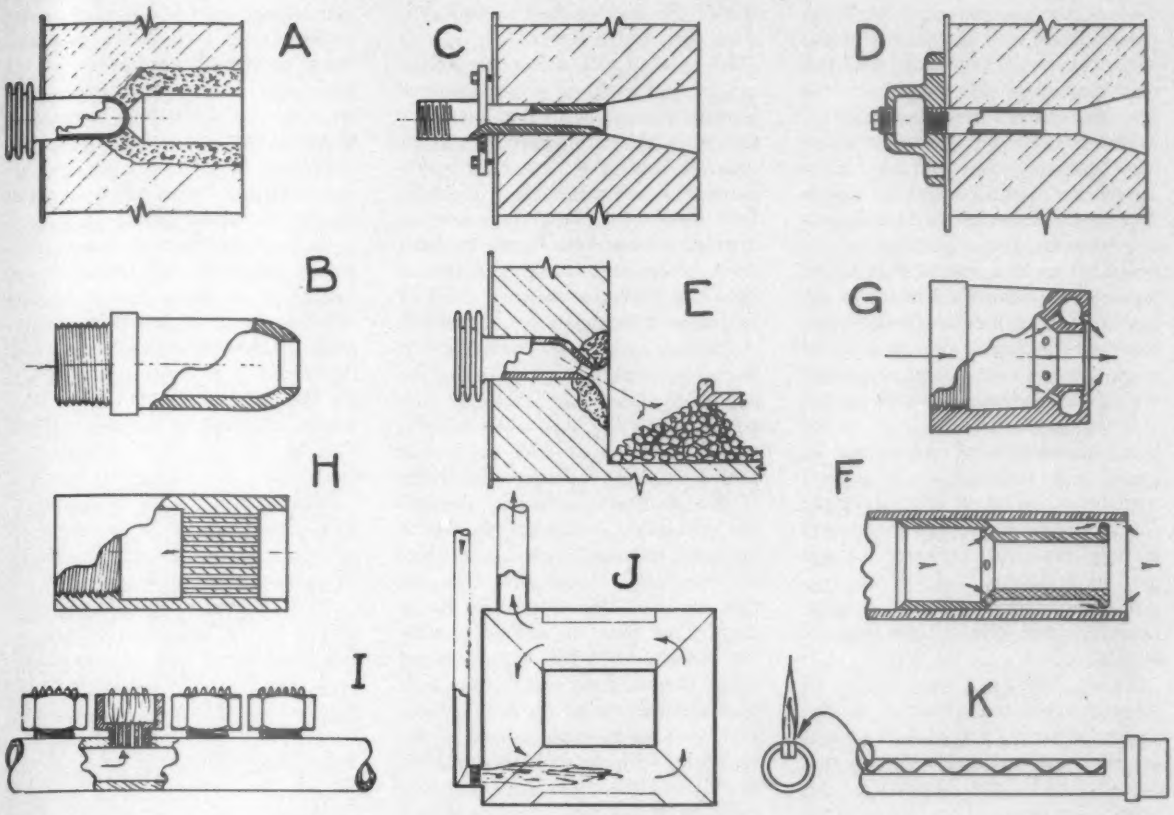
Many of the principles of correct design and application for atmospheric gas burners were originally evolved in connection with the preparation of the Practical Gas Educational Courses of the National Commercial Gas Association in 1915-1916. In 1919 and 1920 the Industrial Fuel Committee of the American Gas Association cooperated with the United States Bureau of Standards in some important supplementary work particularly pertaining to the design of venturi tubes. Much of this work has been published,† with the result that ample design data is now available. In regard to a general discussion of domestic atmospheric gas burners, the article by R. M. Conner, entitled "Domestic Gas Burner Design and Application," published in the February issue of THE MONTHLY, is noteworthy.

Although the material mentioned above primarily concerns domestic equipment, the general design details treated in these sources apply equally well here, for industrial atmospheric burners function precisely as do corresponding domestic units. There are, however, several features of atmospheric burner application that must be remembered in considering this type of burner for industrial work. Atmospheric burners can generally be classed as applicable to processes which require a temperature of less than 1,000° F. Above this temperature they are rarely used, and even then only under special conditions, but below this temperature they are used extensively. The simplicity of operation and relatively low initial cost of atmospheric combustion systems is to a large extent responsible for their widespread usage.

However, inasmuch as this type of burner requires secondary air, which in the interest of complete combustion must always be considerably in excess

* Terms used in this paper are in accord with the "Standard Nomenclature for Industrial Gas Combustion Systems," Report No. 694, published by the A. G. A.

† Notable treatises have been:
National Commercial Gas Association, Practical Gas Educational Courses, Design and Application of Atmospheric Burners.
National Commercial Gas Association, Practical Gas Educational Courses, Blast Burner Design.
U. S. Bureau of Standards Technologic Paper No. 193.
U. S. Bureau of Standards Circular No. 394.
U. S. Bureau of Standards Research Paper No. 446.
"Design of Gas Burners by the Use of Fundamental Flow Formulae."
Frank Wills, Western Gas, p. 87, Aug. 1931.



of that actually required to burn the mixture, it is almost impossible to control within close limits the resulting furnace atmosphere. Consequently, the industrial application of atmospheric burners is practically always limited to (1) processes which require rather highly oxidizing furnace atmospheres and in which the amount of excess oxygen does not have to be held within close limits, or (2) installations in which the flue gas does not come in contact with the work being heated and, therefore, does not require any special control.

Far more generally used for industrial heating purposes than the atmospheric type of burner, however, is the pressure burner employing premixed air and gas. Before discussing the details of design of such devices, their advantages and disadvantages, as well as the types of application for which burners of this kind are best suited should be noted, for in industrial work of any kind the type of burner chosen is important and must be governed by the nature of the heating job to be accomplished and the required conditions of furnace operation.

Pressure burners can be used for the development and maintenance of almost any desired operating temperature, but are most commonly employed on installations operating at temperatures in excess of 1,000° F.

Further, since all the air needed for combustion is frequently premixed with the fuel gas before entering the burner, the resulting furnace atmosphere can be made neutral, oxidizing, or reducing, and maintained at any desired point within close limits regardless of the gas rate. A decided advantage of the pressure burner employing premixed gas and air over the atmospheric burner lies in the facts that very large quantities of gas can be completely burned in relatively small combustion spaces, and very high temperatures may therefore be secured. In addition, external influences, such as climatic conditions, affecting draft, room temperature, and the like, have little effect on the performance of pressure burners; much less, in fact, than on atmospheric systems. The fact should not be overlooked, however, that pressure burners generally require (1) relatively expensive mixing and proportioning devices necessary to maintain the desired furnace atmosphere regardless of the quantity of gas being burned as well as (2) mechanical equipment necessary to make available either air at pressures considerably above atmospheric pressure or gas at pressures higher than that generally afforded in appliance lines. Atmospheric burner utilization, on the other hand, involves neither of the above items of expense.

Multitude of Designs

To select or design, for a specific installation, a useful and efficient pressure burner employing premixed gas and air, requires in addition to a knowledge of certain fundamentals of design and application, a familiarity and experience with common types of industrial premixed fuel burners. Hence, in the chart are illustrated some different varieties of representative in-

dustrial pressure burners employing premixed air and gas. Some of the constructions illustrated are used extensively, others less frequently, but the group selected serves to indicate the multitude of design variations which have been tried and found feasible for certain uses. In the following discussion the functions of the most important of these design features will be pointed out. However, to do this most logically one should consider the air-gas mixture in industrial combustion systems as it flows from its point of origin through to the point of ignition within the combustion space.

Before gas is fed to burners of the type illustrated, it, of course, must be mixed with sufficient air to support combustion. This is effected in the air-gas mixing device. With pressure burners consuming premixed air and gas, the mixing unit, unlike the venturi of an atmospheric burner, is sometimes separated some distance from the burner.

Today, there are a great number of different types and makes of mixing devices, involving various mechanics of proportioning and employing different pressure media for inspirating purposes. The choice of the type of mixer should be governed to a large extent by the accuracy to which the furnace atmosphere must be controlled throughout the required range of inputs to the burners, and by the availability of usable media for inspiration.

If supplies of high pressure gas are available, high pressure gas mixing systems may be used; or, if large quantities of high-pressure air are to be had at no appreciable extra cost, high-pressure air mixing devices may be employed. On the other hand, where neither is readily available, it is often necessary to either use an air blower and a low-pressure air mixing system, or a gas booster and a high-pressure gas mixing system. To determine which of these latter two possibilities is the more desirable, the cost of equipment and piping must be thoroughly considered, for the choice is mainly one of economics. In some cases a central proportioning unit can be justified, in which case the air-gas mixture is piped under pressure to the appliances. In any case, careful consideration must be given to the mixing system if the least costly and most efficient operation is desired.

After leaving the mixing device the air-gas mixture flows to the burner or burners through a conduit known as the manifold. In order to insure thorough mixing of air and gas before burning, a reasonable length of manifold should be placed between the mixing device and the burner or burners. In no case should the mixing device be placed immediately ahead of the burner if it can possibly be avoided.

Further, to keep the turbulence in the air-gas stream at a minimum, the manifold piping just ahead of the burner should be, if possible, straight, smooth, and in line with the burner port for at least eight pipe diameters. If this condition is neither advisable nor obtainable, provision should be made for installing in the burner body a "straightener" (complete cross fin type at least 2½ port diameters in length) just ahead of, and in line with, the burner port. Where burners are supplied with many small ports each over eight diameters in length, however, such action is not necessary. By complying with the principles set forth in this and the preceding paragraph, mixtures of gas and air properly proportioned at all times and free from excessive turbulence (conducive to irregular combustion and noisiness) may be delivered to the burner itself.

Countless Features

As for the burner, possibilities seem to be almost limitless. It will be observed from the illustrations that simple or complicated port arrangements may be used, that various methods of holding flames on the ports at high rates are feasible, that countless special features may be evolved, and that sizes, capacities, and heating characteristics may cover wide ranges. Burners A, B, C, D, and E employ simply a circular, single port; burners F and G one main port with smaller accessory openings; burners H, I, and J many relatively long adjacent drilled holes (such units are known as multiple-port burners); and burner K a specially arranged ribbon type port. In burners A, C, and D, flames are retained by refractory tunnels; in burners H, I, and J by short metal or composition projections corresponding to dwarf tunnels; in burners G and F by special accessory port arrangements which supply either a ring of tiny pilot flames or a band flame around the periphery of the base of the main flame; in burner E by a bed of refractory material in which combustion is fostered; and in burners B and K by no means unless it be associated with the construction of the combustion space.

Each of the burners shown represents a common type employed very extensively in connection with many different kinds of industrial installations. However, with regard to special characteristics of construction or usage, the following comments may be interesting, although in no event should they be considered as exhaustive or conclusive. The immersion burner K is used considerably for the melting of soft metals, such as die cast metals or stereotype metal, and for the heating of various industrial liquids.

With burner E combustion occurs chiefly in the bed of refractory material and, hence high degrees of radiated heat from the incandescent bed may be secured with this type of equipment. Burners similar to B, G, F, I, and K may be made to induce part of the air for combustion in secondary form; whereas the other types shown are rarely employed in this manner. Burner H yields unusually quiet and orderly combustion without excessive noisiness. From these scattered and incomplete statements, it may be truly inferred that, although all types of burners are used for all types of heating tasks, each type in the ultimate analysis is best applied to a certain group of jobs, some types, of course, being more generally applicable than others.

If it can be assumed that, as a result of considerations such as have been suggested above, the types of burner, mixing, and manifolding systems to be used have been decided upon, the process of adapting the burners to the appliance may be initiated. The amount of heat necessary to do the required job must first be computed as follows:

From the constructional details of the furnace, the amount of heat that will be lost through the walls can be determined, and from this in turn the minimum or maintaining gas rate of the appliance. Next, the amount of heat necessary to raise the maximum load in the furnace to the desired tem-

perature in the required time is computed. Adding this gas rate to the maintaining gas rate, the maximum amount of gas required by the equipment is obtained. If the appliance is to be intermittently operated, however, it may be required to reach the desired temperature from a cold start in a given length of time. In this event, the amount of gas required for the heating-up period must be determined from the constructional details of the furnace, and, if it exceeds the maximum rate previously calculated, the new maximum rate must be used in ensuing computations.

Factors Involved

The number of burners to be used depends, of course, both upon the maximum input required and the necessary turn-down ratio of the burners. This latter governing factor may be secured simply by dividing the maximum required gas rate by the minimum or holding rate, the rate necessary only to counteract the heat losses from the appliance while the empty furnace is maintained at the process temperature.

In order to use the regular pressure burner with the usual manifold pressures encountered, the turn-down ratio should be less than five. If greater than five, either two-stage burners must be employed (although in such an event their characteristics should be carefully studied to determine if they can be used satisfactorily with the appliance under consideration), or two or more separate sets of burners may be used, one or more sets being turned off entirely when not needed.

This latter arrangement is frequently employed with intermittent types of appliances, in which case all the sets of burners are used for the heating-up period, while only one set (usually the largest) is necessary when the furnace is up to temperature. Cost and heat distribution are the two factors which generally control the choice of the number of burners.

The greater the number of burners, the greater is the initial burner cost, but more even, generally, is the heat distribution in the work chamber. Two other factors should also enter into the determination of the number of burners. These are, the amount of gas that can be completely burned and the amount of noise created by the burner.

From the standpoint of combustion, the smaller the burner, the larger the amount of gas that can be completely burned per unit of combustion space; from the standpoint of noisiness, the smaller the burner, the greater the noise per burner. When it is possible to employ multiple-port burners, a larger amount of gas per unit of combustion space may be completely burned than with single port burners of the same total area; and, likewise, if the ports are as much as 8-port diameters in length, multiple-port burners will be appreciably quieter than equivalent single-port units. In addition to all these items, the number of burners used is also influenced to a large extent by the dimensional relationship of the furnace.

Knowing the maximum amount of gas to be burned, as well as the number of burners to be employed, the maximum amount of gas to be consumed per burner may be secured. From this data and the manifold pressure, determined by the method of mixing used, the port area per burner can be roughly ascertained.

Although one may now know the number and the size of the burners to be used, there are several constructional details to be kept in mind in choosing the best individual burner of the type selected. With very few exceptions the burner port is never the same size as the internal manifold area. In other words, the port serves as a construction to the flow of gas, allowing a fairly wide range of turn-down before flash-back occurs. The ratio of burner body diameter to burner port diameter is known as the body-to-port ratio. There are a great number of contentions as to just how large this ratio should be. However, investigation at the American Gas Association Testing Laboratory indicates that the advantages to be gained by a large ratio are questionable, except perhaps by obtaining better mixing and a reduction in turbulence as a result of the relatively large manifold size. For ease of operation and freedom from flash-back, the body-to-port ratio should probably be at least two or better.

Because of the required difference in burner body and burner port diameters, there should, in most burner types, be some definite configuration of port approach to direct the flow of the air-gas stream to the port. This constriction should be painstakingly designed if the least amount of noise is to be created and greatest ease in lighting and manipulation is to be secured. From experimental data the simplest form of approach, the straight or conical approach, appears to be appreciably better than either concave or convex types, the smaller the included angle of the conical portion, the better the design. It is recommended that conical approaches include convergence angles of about 20° (the side forms an angle of 10° with the center line or axis of the burner port).

Some Equipped with Pilots

Beyond the port approach and port there may or may not be a tunnel to hold the flame on the burner. When no tunnel is used burners are very often equipped with a pilot or pilot ring (see Figures F and G). This pilot is usually made integral with the burner and operates by diverting a small portion of the air-gas mixture from the burner body into an opening located around the burner port. From this opening pilot flames are directed toward the burner port, tending to keep the main flame lit. Although this type of arrangement permits greater quantities of gas to be burned than could be consumed without it, a tunnel burner can burn considerably more gas per cubic foot of combustion space than can a non-tunnel burner. To overcome this difficulty, non-tunnel burners are very often operated with insufficient primary air, allowing more gas to be burned before the flame blows off the port. The remaining air required for complete combustion is allowed to enter the appliance through an opening provided around the burner. This secondary air, in addition to facilitating combustion, also cools the burner. Difficulty in controlling furnace atmosphere throughout the range of burner turn-down constitutes the chief objection to this practice.

If, on the other hand, a tunnel burner is employed, the necessity of a pilot is eliminated and better control of furnace atmospheres is permitted, since tunnel burners can be tightly encased in appliance walls. In reality, a tunnel has two purposes to fulfill:

First, to hold the flame on the burner port (this effect is especially needed when the furnace is cold), and second, to permit, through the influence of the tunnel walls, the burning of relatively large quantities of gas in small spaces. Several types of tunnels are available. The two varieties most commonly used are cylindrical and conical. In Figure 1, Burner A illustrates the former and Burners C and D the latter types. Certain pressure burners, by means of which gas is burned at high rates, may use special types of tunnels or equivalent schemes (See Figure 1, E). However, such applications must be classed as special adaptations and may not be treated in this brief discussion.

The three principal variables encountered in the design of cylindrical type tunnels are: the length, the diameter, and the angle of the short conical entrance section. From a practical standpoint, if the tunnel is too short, the flame will blow off the burner port and the purpose of the tunnel will be nullified. In general, cylindrical tunnels should, correspondingly, be not less than four burner port diameters long. On the other hand, if the tunnel is too long, excessive resonant noisiness, as well as a reduction in the maximum attainable gas rate, will result due to the building up of a back pressure in the tunnel. It is, therefore, very desirable to have a tunnel that is just long enough to accomplish its purpose.

With regard to the diameter of cylindrical tunnels, care is again necessary. If it is too large, the air-gas mixture will burn on the port as an open flame, and if too small, the tunnel will serve merely as an extension of the port. A diameter must be chosen which will fall between these two extreme conditions. In general, for convenience in operation, the diameter should be not less than two burner port diameters, and rarely more than three. From the standpoint of noisiness, the tunnel should be as short and as small in diameter as possible. Finally, the conical section adjacent to the port appears to exert little effect on combustion. However, for gases with a high ignition velocity (manufactured gases), the included angle of this section should be large, at least 90°, in order to keep the burner end of the tunnel from becoming too hot and deteriorating or causing flash-back. For slower burning gases (natural gas) a smaller angle can be employed, although the larger angle seems quite satisfactory.

Conical Tunnel Design Factors

The factors governing the design of conical tunnels are very similar to those just stated for cylindrical ones. They are, principally, the angle of the tunnel and its length. The possible variation in the tunnel angle consistent with acceptable operation is rather small, especially if both natural and manufactured gases are to be burned in the same tunnel. A tunnel whose sides make an angle of about 7½° with the center line of the tunnel, i.e., an included angle of 15°, is recommended for general use on both manufactured and natural gases. Although fast burning manufactured gases can be successfully burned in tunnels whose sides make a 5° angle with the center line, natural gases and other relatively slow burning gases tend to burn at the ends of such small tunnels, much as if the tunnels were merely extensions of the port.

There are several other factors to be remembered in designing burner tunnels. The surface or contour should be as smooth as possible. This is necessary to insure least turbulence and minimize noisiness of combustion. Further, a smooth tunnel causes minimum back pressure on the port stream. The conical portion of a tunnel next to the burner port should never extend to the very edge of the port. A small step of 1/16 to ⅛ inch should be provided in order to preclude the possibility of minute particles of tunnel material interfering with the passage of the air-gas mixture and thus creating turbulent flames. On the other hand, this step should not be any larger than necessary to accomplish the end just indicated. Otherwise, unnecessary noise will be created. This latter condition is especially true in the case of conical tunnels.

One final consideration in the design of pressure burners employing premixed gas and air merits attention. Whenever pressure burners are tightly encased in furnace walls and relatively high temperatures are used, special methods of cooling the burners must often be employed. This may be accomplished by providing (1) cooling fins on the burner body, (2) a cooling well in the side of the furnace wall so that a large part of the burner is exposed to air rather than hot refractories, (3) water-cooled burner constructions.

The method employed will be determined by the burner wall temperature, the length of the heating period, and the economies of the various procedures. Cooling fins can generally be successfully employed at high furnace temperatures on the burners of intermittently operated appliances, or on the burners of continuously operated appliances where the walls are not very thick. Cooling well construction is perhaps more costly, but is sometimes necessary when thick walls are used. Water cooling systems are, of course, the most effective but if such are employed, the cost of the cooling water must be added to the cost of furnace operation and the greater initial expense of burner equipment considered.

Third Type

The third and last general type of industrial burner to be considered in the present paper is that type of burner in which the air and gas are not intermingled prior to entrance into the combustion chamber. Under this classification will fall conventional nozzle-mixing burners, luminous flame burners, and diffusion flame burners. Before specifying any one of these burners for an installation, a great deal of study is necessary to be sure that its application is correct for the desired conditions. With this type of burner, in which air and gas are not premixed before reaching the burner ports (except in a few cases where a small part of the air is mixed with the gas ahead of or in the burner) a lower flame temperature practically always results. Also a longer flame is obtained. The length and luminosity of the flame may be controlled as well as the atmosphere immediately surrounding the work. Operating temperatures, similar to those obtained with pressure burners employing premixed air and gas, can be attained, although the type of burner in question is not generally employed for excessively high temperature work.

Such burners employing nozzle-mixing of the air and gas have the following advantages over pressure burn-

ers employing premixed air and gas: (1) Unlimited turn-down ratio; (2) the ability to deposit free carbon on the work being heated in order to obtain certain desired surface conditions; (3) the development of radiant energy in a form that will penetrate certain materials, such as glass, etc., to a greater extent than the radiant energy developed with a non-luminous burner; (4) the feasibility of obtaining long flames of relatively constant temperature; and (5) the elimination of the usual mixing device.

The disadvantages of these burners as compared to those employing premixed air and gas are: (1) The complete combustion of less gas per cubic foot of combustion space; (2) a higher cost for burners and installation if special luminous or diffusion-flame burners are employed; (3) greater difficulty in maintaining the desired furnace atmospheres; and (4) usually more complicated proportioning devices, increasing the difficulty of obtaining the same furnace atmosphere throughout the range of turn-down of the burner.

A simple nozzle-mixing burner may consist merely of a single air port and a single gas port, or an intricate burner of many ports of each type. These ports may be made concentric with each other or placed in vertical or horizontal rows. In fact, almost any combination of openings desired may be employed. If more than one air and one gas port are used, they are very often staggered. It is quite obvious that the greater the number of ports the better will be the mixing in the combustion zone, and likewise, the shorter will be the flame. In general, the air ports are made considerably larger than the gas ports to accommodate the larger quantity of fluid required to flow through them.

Various degrees of flame luminosity are obtainable. If a flame is required that is highly luminous in nature, part of the gas being burned may be cracked into free carbon, or carbon may be externally injected into the flame. If the former method is used, a special nozzle-mixing burner is generally employed by means of which a gas rich mixture is burned, the additional air for combustion being usually supplied through a port placed some distance from the heel of the flame. This port may or may not be incorporated in the same burner body. Generally, the nearer the secondary air port is located to the flame body, the shorter will be the total flame. By adjusting the percentage of the total air that is supplied as primary air, the characteristics of the flame can be controlled over a considerable range. If it is desired to deposit free carbon in the furnace, this also can be accomplished by varying the air proportions, or by injecting fine particles of carbon into the air or gas streams.

Diffusion Burners

If the air and gas streams emitting from a nozzle-mixing burner are both free from turbulence and travel along the furnace at the same speed, burning will take place only at the surfaces of the individual streams of air and gas as they diffuse into each other. Burners operating upon such a principle are known as diffusion burners. Generally, their flames are luminous, and by controlling the velocity of air and gas streams, the lengths of these flames may be held within desired limits. To protect the work being heated, a blanket of raw gas flowing directly over the work, is very often discharged from a special port or series of ports, the heating flame being located immediately above this protective stream.

Because of the very different special designs and applications of the various burners employing nozzle-mixing of air and gas, further general details of design cannot be given. To assist in determining applicability, however, it may be noted that the greatest present-day usage of this type of burner has grown from its ability to produce (1) an atmosphere or furnace condition that allows but a minimum degree of scaling on certain metals, and (2) a high percentage of radiant heat. This type of equipment should be used only for the special task at which it excels and not for general industrial heating where pressure burners employing premixed air and gas can be used to advantage.

Closely allied with burner design, performance, and application is the design and consequent influence on combustion of the combustion chambers. Although properly chosen burners applied in the proper way may be employed in an appliance, the installation may fail to perform effectively and efficiently if the effect of the combustion space is not given due consideration. The factors influencing the design of combustion spaces constitute the subjects of extensive research investigations being conducted at the American Gas Association Testing Laboratory under the supervision of the Committee on Industrial Gas Research. Published material concerning the results secured throughout the past two years on these items is available‡ and should be of interest. Although the work (at present concerning the effects of operating temperature and furnace pressure on the combustion of industrial gas) is not completed, results secured to date indicate very definitely that more attention should be accorded the design of the combustion chambers of appliances.

In conclusion, it might well be emphasized that, in general, any gas heating job can be accomplished with one of several different kinds of burners. However, if all conditions are carefully analyzed, one specific type will usually be found to best meet the particular requirements of the installation. Therefore, designers and industrial engineers should not permit precedent to blindly guide the selection of burners, but should treat each choice as a separate engineering problem. It is hoped that with the help of the data given in this article, and bulletins referred to, the solution of industrial gas burner design and application problems may be greatly simplified, thereby elevating present-day levels of industrial gas utilization and assisting the gas industry to capture additional loads in the face of competition from other fuels.

‡"Research in Fundamentals of Combustion Space Requirements in High Temperature Gas Furnaces," American Gas Association Monthly, July and August, 1933. First Bulletin on "Research in Fundamentals of Combustion Space Requirements in High Temperature Gas Furnaces," Report No. 723, American Gas Association, 420 Lexington Avenue, New York, N. Y.

VICTOR A. HAYS IS DEAD

VICTOR A. HAYS, vice-president and general manager of the Knox Utility Corporation and Knox Engineering Corporation, Vincennes, Ind., died May 3 at the age of seventy-one years. Death was caused by heart trouble. Mr. Hays, who was well-known in the natural gas industry, was a member of the American Gas Association.

New Graphical Method of Determining Flue Losses from Industrial Gas Furnaces

By H. W. SMITH, JR.

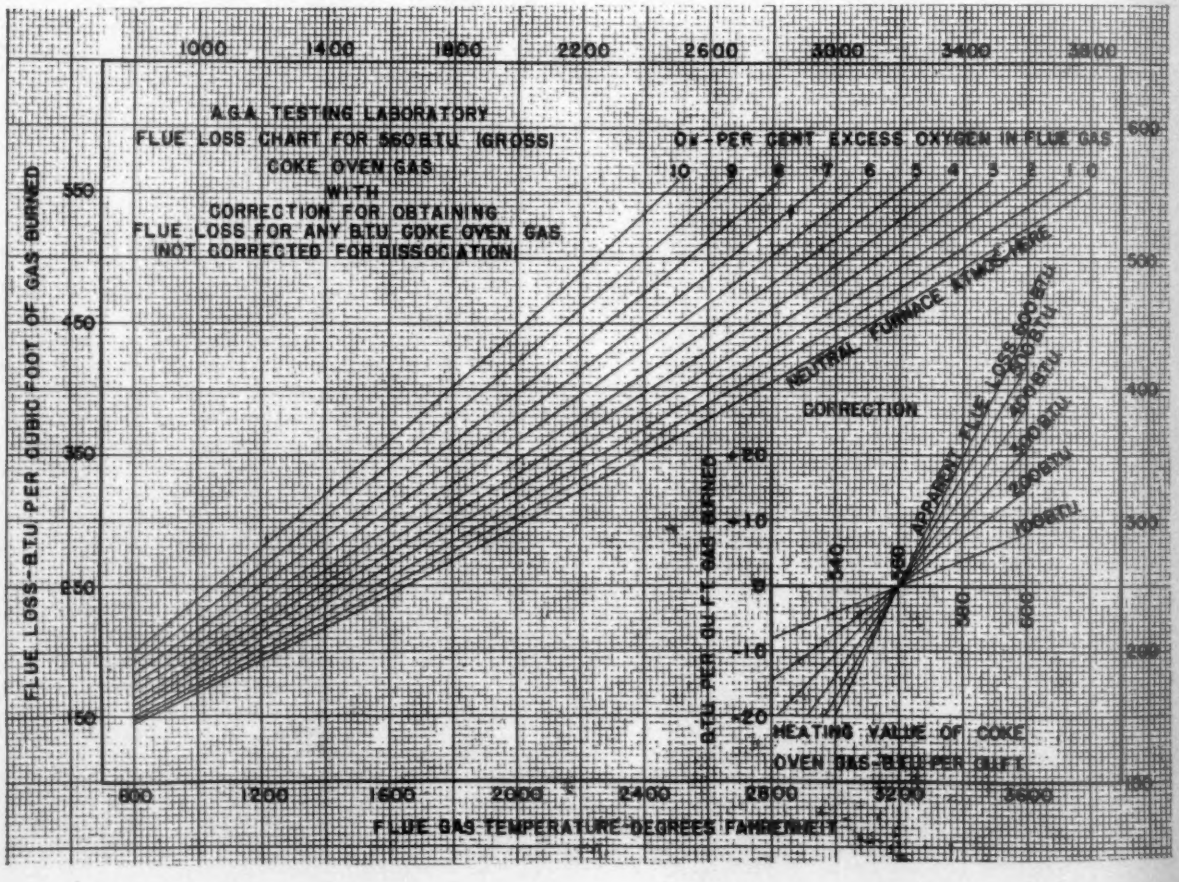
A. G. A. Testing Laboratory

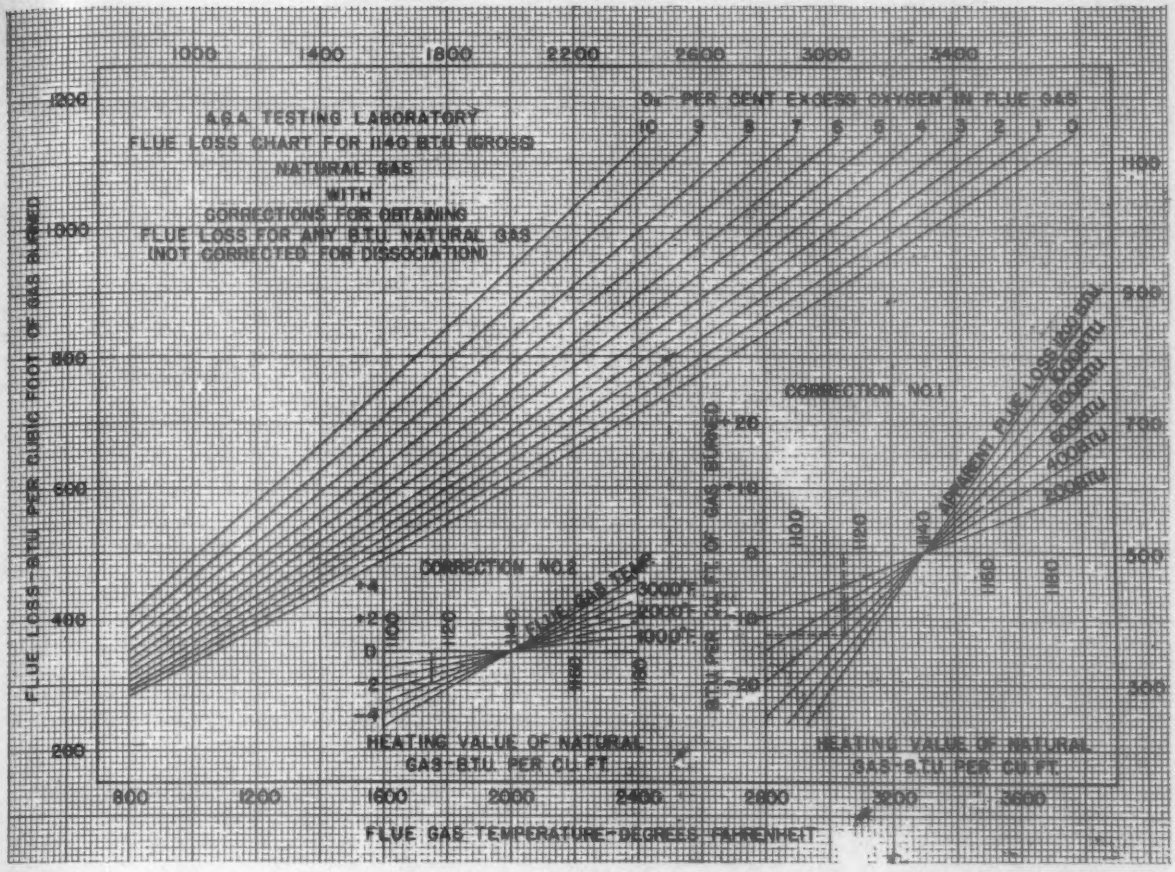
THE precise computation of flue losses from high temperature industrial gas furnaces is vital to the successful solution of a great many industrial gas utilization problems. Unfortunately, however, accurate determinations must take into account data which very frequently is not available; and, consequently, numerous methods of graphical and computational approximation have come into common use. In the course of investigations conducted at the A. G. A. Testing Laboratory under the sponsorship of the Committee on Industrial Gas Research, however, the ordinary procedures for ascertaining flue losses proved to be inadequate, with the result that the charts shown herewith were developed. Flue loss determinations made with the aid of these curves are both rapid and amply accurate for all reasonable demands.

In the preparation of these charts Laboratory engineers computed, with all possible precision, flue losses in B.t.u. per cu.ft. of gas burned for hundreds of different conditions of industrial gas utilization representing various combinations of flue gas temperature, per cent excess oxygen, type of gas, and gross heating value of the gas. Analyses of the results culminated in the preparation of the charts.

From them the flue loss corresponding to the known conditions of flue gas temperature and furnace atmosphere—per cent excess oxygen—may be found, even if the gross heating value of the gas is not identical to that on the basis of which the charts were drawn. To do this it is only necessary to apply the corrections determined by the smaller accessory plots.

To illustrate the procedure, let us assume that a steel treating furnace consuming natural gas, having a heating value of 1115 B.t.u. per cu.ft., is operating at 2500 degrees Fahrenheit with an oxidizing furnace atmosphere containing 2.2 per cent excess oxygen (O_2). From the large family of flue loss curves for 1140 B.t.u. per cu.ft.





natural gas shown in the figure, an approximate flue loss of 800 B.t.u. per cu.ft. of gas burned is secured. To compensate, however, for the deviation between the actual heating value of the gas burned and that upon the basis of which the curves were computed, two corrections must be applied to the apparent flue loss of 800 B.t.u.

The first correction for heating value is —12.5 B.t.u. per cu.ft. of gas burned, as obtained from the correction family employing flue loss as a parameter. The second correction is, in turn, —2.0 B.t.u. per cu.ft. of gas burned, as obtained from the correction family employing flue gas temperature as a parameter. Hence, the true flue loss may be fixed at 800 —2.0 —12.5 = 785.5 B.t.u. per cu.ft. of gas burned. Similar procedures must be followed where coke oven gas constitutes the fuel employed, although, of course, the second set of curves should be used. Inasmuch as the flue gas temperature correction, applied in the case of natural gas (Correction No. 2 on the chart), is of negligible magnitude where coke oven gas is employed, no such plot appears on the chart for manufactured gases.

It has been demonstrated on several occasions at the Laboratory that flue loss calculations for high temperature installations made on the basis of the curves here presented, are of considerably greater precision than those ordinarily made in the field at the present time. Their value lies chiefly in the fact that, whereas most simplified methods of graphical approximation yield the flue loss for a similar gas of nearly, but not exactly, the same heating value as the one used, the method here discussed affords a reliable and tested manner of correction to the exact heating value.

Nothwithstanding, it must be realized that this method of determination is not entirely devoid of error. The curves shown are not corrected for the effects of dissociation of water vapor into hydrogen and oxygen and carbon dioxide into carbon monoxide and oxygen. If the percentage of excess air is at all sizable, however, the error introduced is small. Furthermore, in the computation of the charts here offered, all condensation into liquid water of the water vapor contained in flue gases was assumed to occur at room temperature (60 degrees Fahrenheit). Inaccuracies arising from this source are, fortunately, negligible in practically all field work.

These American Gas Association charts, therefore, offer what is believed to be the most accurate known means of readily determining flue losses from high temperature gas furnaces under widely varied conditions of operation and on the basis of customarily available data. As such, the charts shown herewith should be of distinct value to industrial gas engineers and others concerned with effective utilization of gas as a fuel for industrial heating.

Affiliated Association Activities

Missouri Association of Public Utilities

Fred Karr

FRED KARR, president of the St. Joseph (Mo.) Gas Company, was reelected president of the Missouri Association of Public Utilities at the annual convention of the association held April 19 and 20, at the Elms Hotel, Excelsior Springs, Mo.

Other officers elected were: First vice-president, C. E. Michel, Union Electric Light & Power Co., St. Louis, Mo.; second vice-president, C. F. Farley, Kansas City Power & Light Co., Kansas City, Mo.; third vice-president, D. W. Snyder, Jr., Missouri Power & Light Co., Kansas City, Mo.; treasurer, Hermann Spoehrer, Union Electric Light & Power Co., St. Louis, Mo.; secretary, N. R. Beagle, Missouri Power & Light Co., Jefferson City, Mo.; assistant secretary, Jesse Blythe, Jefferson City, Mo.

Executive Committee—W. H. Swift, Jr., Springfield Gas and Electric Co.; T. J. Strickler, Kansas City Gas Co.; L. W. Helmreich, Capital City Water Co., Jefferson City; E. H. Lewis, St. Louis County Gas Co., Webster Groves; Fred H. Luecke, Missouri Public Service Co., Warrensburg; A. E. Bettis, Kansas City Power & Light Co.; H. M. Patton, Union Electric Light & Power Co., St. Louis, and H. B. Newman, Missouri Utilities Co., Cape Girardeau.

The member companies of the association include virtually every privately owned electric, gas, water, and street railway utility in Missouri. About 200 delegates from throughout the State attended the meeting.

Judge H. O. Caster, New York City, president of the American Gas Association, and H. S. Tritle, East Pittsburgh, Pa., president of the National Electric Manufacturers Association, delivered addresses at the convention.

Among the other speakers were: A. W. Conover, Bristow, Okla., member of National N. R. A. Code Authority; Dr. Allen B. Albert, Chicago, Ill., American Federation of Utility Investors, Inc.; R. M. Conner, Cleveland, Ohio, director, American Gas Association Testing Laboratory; J. F. Porter, Kansas City, Mo., president, Kansas City Power & Light Co.; Frank R. Innes, Chicago, Ill., Western Editor of *Electrical World;* N. T. Veatch, Jr., Kansas City, Mo., consulting engineer; and E. A. Freund, St. Louis, Mo., Load Development Engineer, Union Electric Light & Power Co.

An open forum for the discussion of local utility problems was held at the night session April 19. The three subjects discussed were: "A Study of Rates of Municipal and Privately Owned Utility Plants in Missouri," "Today's House Heating Market," and "Diversion of Utility Services." The leaders of the discussion were: O. F. Funk, St. Louis, Mo., Union Electric Light & Power Co.; F. M. Rosenkrans, Kansas City, Mo., Gas Service Co.; and Dudley Sanford, Webster Groves, Mo., St. Louis County Gas Co.

An employees' speaking contest, sponsored by the association, was held on the evening of April 18, in connection with the convention. Men and women employees of all privately owned utilities in Missouri were eligible. The contestants were selected by company eliminations.

The winners in the State contest were: Women—First, Miss Rosa Burchett, Kansas City Power & Light Co.; second, Miss Thelma L. Feeney, Union Electric Light & Power Co., St. Louis. Men—First, Robert W. Cleveland, Union Electric Light & Power Co., St. Louis, Mo.; second, Herbert Henderson, Missouri Power & Light Co., Jefferson City, Mo.

Loving cups were given to the first and second prize winners in each class.

The annual banquet and carnival was held on the evening of April 20. President Karr acted as toastmaster. A special entertainment program was provided for the ladies attending the convention.

Convention Calendar

JUNE

4- 5 Canadian Gas Association
Montreal, Canada

4- 7 Edison Electric Institute
Atlantic City, N. J.

5- 8 The Institution of Gas Engineers
London, England

18-21 National Association of Purchasing Agents
Cleveland, Ohio

25-29 American Home Economics Association
Pennsylvania Hotel, New York, N. Y.

25-29 American Institute Electrical Engineers
Hot Springs, Va.

25-29 American Society for Testing Materials
Chalfonte-Haddon Hall, Atlantic City, N. J.

28-30 New York-New England Regional Gas Sales Conference
Griswold Hotel, New London, Conn.

SEPTEMBER

1- 4 International Gas Union
Zurich, Switzerland

9 American Trade Association Executives
Wernersville, Pa.

11-13 Pacific Coast Gas Association
Del Monte Hotel, Del Monte, Calif.

24-28 American Transit Association
Cleveland Public Auditorium, Cleveland, Ohio

OCTOBER

14-19 American Dietetics Association
Mayflower Hotel, Washington, D. C.

Wk. 29 American Gas Association Convention and Exhibition
Atlantic City, N. J.

Michigan Gas Association

THE forty-first annual meeting of the Michigan Gas Association will be held in Grand Rapids, June 19 and 20, at the Hotel Pantlind.

On the morning of the 19th there will be a joint meeting with the Michigan Electric Light Association to consider common problems as presented by speakers of local prominence. On the morning of the 20th there will be a program of papers and addresses on live topics pertaining to the gas industry in Michigan.

Walter E. White, gas engineer of the Commonwealth & Southern Corporation, president of the Michigan Gas Association, will preside and give the president's annual address. The natural gas situation in Michigan will be presented in an address by Arthur W. Stace, director of the Michigan Utilities Information Bureau.

It is hoped to have information relative to the NRA Code for the manufactured gas industry presented by Alexander Forward, managing director of the American Gas Association.

The coke situation in Michigan will be discussed by J. M. Woods, sales manager of the Semet-Solvay Company. D. E. Herringshaw of the Consumers Power Company will present a paper on "Oil Gas as a Substitute for Natural Gas." George E. Ludwig, Grand Rapids Gas Light Company, will discuss, "Progress in the Control of Gum Deposits." H. C. Haroldson, Consumers Power Company, will tell about the successful campaign in

the Bay City and Saginaw territory to install house heating equipment after natural gas had been turned on in those cities.

Professor Alfred H. White, under whose direction the Gas Fellowship at the University of Michigan has been conducted since its inception over thirty years ago, will present a report on the work done during the past year.

Entertainment features will include an afternoon outing at the beautiful Blythefield Country Club with an informal cabaret dinner at the Hotel Pantlind in the evening.

Pennsylvania Gas Association

T. W. McDonald

THE twenty-sixth annual convention of the Pennsylvania Gas Association, held May 8-9-10 at Galen Hall, Wernersville, Pa., proved to be one of the most successful from all points of view of any in the history of the association. Capacity audiences greeted the speakers at the morning and evening sessions and the average interest of the papers and addresses presented was unusually high.

Prior to the banquet the opening night the following officers were elected to serve during the coming year:

President, T. W. McDonald, of the Pennsylvania Gas & Electric Co., York; first vice-president, E. W. Ehmann, of the Philadelphia Electric Co., Ardmore; second vice-president, H. N. Squier, of the Scranton Spring Brook Water Service Co., Scranton; third vice-president, N. B. Bertolette, of the Harrisburg Gas Company, Harrisburg; secretary, F. W. Lesley, of the Pennsylvania Gas & Electric Co., York, and treasurer, W. G. Sterrett, of the Philadelphia Electric Co., Jenkintown.

Governmental competition with private industry and political attacks upon public utilities were vigorously criticized in addresses delivered by Joseph B. Shannon, Democratic Congressman-at-large, of Missouri, and H. O. Caster, of New York, president of the American Gas Association.

Dr. Meil Carothers, dean of the College of Business Administration, Lehigh University, asserted that the remedial measures of the National Recovery program to date have been beneficial and worth their cost. The R. F. C., C. C. C., farm mortgage loans, home owners' loans, and even the Securities Act, the Stock Exchange bill and the guaranty of bank deposits have probably done more good than harm, although defective in details.

Alexander Forward, managing director

(Continued on page 219)

Associations Affiliated With A. G. A.

Canadian Gas Association
Pres.—Donald G. Munroe, Montreal Coke & Mfg. Co., Montreal, Que.
Sec.-Tr.—G. W. Allen, 21 Astley Avenue, Toronto.

Empire State Gas and Electric Association
Pres.—Alfred H. Schoellkopf, Niagara Hudson Power Corp., Buffalo, N. Y.
Chairman, Gas Section—A. M. Beebee, Rochester Gas & Electric Corp., Rochester, N. Y.
Sec.—C. H. B. Chapin, Grand Central Terminal, New York, N. Y.

Illinois Public Utilities Association
Pres.—Bernard J. Mullaney, The Peoples Gas Light & Coke Company, Chicago, Ill.
Sec.—J. R. Blackhall, Suite 1213, 79 West Monroe St., Chicago, Ill.

Indiana Gas Association
Pres.—R. S. Brunner, Indiana Gas Utilities Co., Richmond, Ind.
Sec.-Tr.—P. A. McLeod, New Castle, Ind.

Michigan Gas Association
Pres.—Walter E. White, Commonwealth & Southern Corp., Jackson, Mich.
Sec.-Tr.—A. G. Schroeder, Grand Rapids Gas Light Co., Grand Rapids, Mich.

Maryland Utilities Association
Pres.—W. A. Tobias, Hagerstown Light & Heat Co., Hagerstown, Md.
Sec.—C. R. Burger, 26 South Jonathan St., Hagerstown, Md.

Mid-West Gas Association
Pres.—C. T. Williams, Sioux City Gas & Electric Co., Sioux City, Iowa.
Sec.-Tr.—Roy B. Searing, Sioux City Gas & Electric Co., Sioux City, Iowa.

Missouri Association of Public Utilities
Pres.—Fred Karr, St. Joseph Gas Co., St. Joseph, Mo.
Sec.-Tr.—N. R. Beagle, Missouri Power & Light Co., Jefferson City, Mo.
Asst. Sec.—Jesse Blythe, 103 West High St., Jefferson City, Mo.

New England Gas Association
Pres.—F. M. Goodwin, Boston Consolidated Gas Co., Boston, Mass.
Exec. Sec.—Clark Belden, 41 Mt. Vernon St., Boston, Mass.

New Jersey Gas Association
Pres.—E. J. Menerey, Peoples Gas Co., Glassboro, N. J.
Sec.-Tr.—G. B. Webber, Public Service Electric and Gas Co., Newark, N. J.

Ohio Gas and Oil Men's Association
Pres.—L. K. Langdon, Union Gas & Electric Co., Cincinnati, Ohio.
Sec.-Tr.—Wm. H. Thompson, 811 First National Bank Bldg., Columbus, Ohio.

Oklahoma Utilities Association
Pres.—H. B. Cobban, Northeast Oklahoma Railroad Co., Miami, Okla.
Mgr.—E. F. McKay, 1020 Petroleum Bldg., Oklahoma City, Okla.

Pacific Coast Gas Association
Pres.—Geo. P. Egleston, H. R. Basford Co., San Francisco, Calif.
Mang. Dir.—Clifford Johnstone, 447 Sutter St., San Francisco, Calif.

Pennsylvania Gas Association
Pres.—T. W. McDonald, Pennsylvania Gas & Electric Co., York, Pa.
Sec.—Frank W. Lesley, Pennsylvania Gas & Electric Co., York, Pa.

Pennsylvania Natural Gas Men's Association
Pres.—F. F. Schauer, Equitable Gas Co., Pittsburgh, Pa.
Sec.-Tr.—B. H. Smyers, Jr., 435 Sixth Ave., Pittsburgh, Pa.

Southern Gas Association
Pres.—W. W. Winter, Atlanta Gas Light Co., Atlanta, Ga.
Sec.-Tr.—S. L. Drumm, New Orleans Public Service Inc., New Orleans, La.

The Public Utilities Association of Virginia
Pres.—T. Justin Moore, Va. Elec. & Power Co., Richmond, Va.

Wisconsin Utilities Association
Pres.—G. V. Rork, Northern States Power Co., Eau Claire, Wis.
Exec.-Sec.—J. N. Cadby, 135 West Wells St., Milwaukee, Wis.

Gas Company Manager Earns Service Trophy

IN the illustration President N. Henry Gellert (right) of the National Public Utilities Corporation is seen presenting to T. F. O'Neil, manager of the Rochelle Gas Company, Rochelle, Ill., the National Utilities Cup for the best record of efficiency and service during the year 1933.

Mr. O'Neil, who has worked for the Rochelle Gas Company for twenty-seven years, faced conditions in 1933 which might have daunted almost any manager; the banks closed, the only large manufacturing plant in the community discontinued operations, and he had the stiffest sort of municipal electric competition. In spite of these factors he maintained the business, showed a slight increase in net earnings, and collected more than 100 per cent of his billings.

The ceremony took place in the office of William G. Rudd, vice-president of The Peoples Gas Light and Coke Company, Chicago, the morning of April 17. In the rear of the photograph, left to right, are O. L. Grime, manager of the Paxton Gas Company, Paxton, Ill., another National company; Alexander Forward, managing director of the American Gas Association, and Mr. Rudd.

National Bureau of Standards Now Official Name

THE Bureau of Standards, U. S. Department of Commerce, is changing its name. The new name proves to be an old one. An order just issued by the Secretary of Commerce restores to the Bureau the original name given it by the Act of Congress of March 3, 1901, establishing the Bureau and specifying that it should be officially named the "National Bureau of Standards."

The following statement by Dr. Lyman J. Briggs, director of the bureau, in making the announcement of the change of name, shows something of the cause and effect of the action.

"Shortly after the Department of Commerce and Labor was established, a departmental order cut off the word 'National' from the Bureau's official name. Prior to that, measuring apparatus certified by the Bureau had received the distinctive symbol 'NBS.' The action shortening the name necessitated changing the symbol to 'BS.'

"Meanwhile bureaus of standards were being established by States, municipalities, and by department stores. 'BS' was even adopted as a private mark by one maker of measuring instruments. The name 'Bureau of Standards' caused confusion and misunderstanding. Test reports were referred to without specifying which bureau of standards was responsible.

"The confusion was not limited to this country. A recent letter from England announced that British standards approved by the British Standards Institution were to bear the designation 'BS' and expressed the hope that the original distinctive name and symbol would be restored to the Bureau.

"Fortunately it appeared that the original name 'National Bureau of Standards' was, in fact, the legally authorized name and the effect of the order by the Secretary of Commerce is to authorize the use by the Bureau of its legally established name to avoid the growing confusion resulting from the shortened name.

"If a measuring instrument—volumetric glassware, for example—passes the strict tests of the Bureau it may receive the Bureau stamp of approval. Under the new order this will hereafter be 'NBS'—a symbol now unique and free from ambiguity. Certified measuring apparatus is advertised and sold on the market bearing the Bureau's stamp of approval and certificate of corrections. Secretary Roper's action will restore and assure the integrity of the Bureau's distinctive symbol."

Book Reviews

"Helpful Suggestions on Heating with Gas." 6" x 9". 23 pp. Illus. with sketches on the bottom border of pages. Pub. by Mid-West Gas Association.

This booklet, which is to be given to existing house heating customers for the purpose of interesting them in their house heating system and to show the desire of the gas company to make the gas heating system as economical as possible, is the first publication specifically directed at existing customers rather than to new prospects. It is a splendid thought to establish in customers' minds the idea that the gas company is sincerely concerned in making the use of gas in the home as satisfactory, convenient and inexpensive as possible.

The book is devoted to setting forth the principles governing the use of gas, and is interspersed with many practical hints for conserving fuel and obtaining better service. After an introduction explaining the various types of heating systems and introducing the notion that temperature, humidity and air in motion are the three important factors to consider, the authors have shown how gas under thermostatic control can be most serviceably used.

Although no technical terminology is used, the information is of practical value and does not avoid discussion of the criticisms sometimes leveled at gas. This is exemplified in a page devoted to a discussion of the effect of flue gases on chimneys. The next few pages of the booklet are devoted to an explanation of the economics of gas home heating and how certain operating conditions may affect fuel consumption adversely. Finally, a paragraph is devoted to the idea of adding a basement room in gas heated homes.

—C. G. S.

GAS ENGINEERS HANDBOOK

On the eve of going to press there has reached our hands a copy of this long-anticipated and much needed compilation. It contains 950 pages arranged in eight sections, all closely packed. Its many charts and tables are supported by descriptive text.

The sections are comprehensive and inclusive as will be apparent from the following which are the subtitles of sections one to eight inclusive:

Mathematical and Conversion Tables and Graphs; Properties of Elements, Common Substances, and Engineering Materials; Properties of Gases, Air, Steam, and Water; Fuels and Combustion; Production of Gas; Testing and Measurement; Transmission and Distribution and Utilization of Gas.

There has always been a demand for such a book as this and it is good to have so much of the reference material which is in daily demand by the gas industry conveniently assembled within the covers of one book. Not the least among its assets are the valuable source references.

The handbook was prepared by a Committee of the Pacific Coast Gas Association consisting of Frank Wills, chairman; Clifford Johnstone, secretary; A. F. Bridge, E. L. Hall, L. M. Klauber, H. L. Masser, William Moeller, Jr., B. G. Williams and S. H. Graf, editor; reviewed by representative members of the Technical Section of the American Gas Association, and endorsed by the Executive Board. We hope to briefly describe its contents in our next issue.

—A. G. K.

Dr. H. Zollikofer Dies in Switzerland

DR. H. ZOLLIKOFER, who had an international reputation as a gas engineer, having gained his early experience in New York and Europe, died April 2 in his native Switzerland, according to the "Gas Journal," London, England, of May 9.

Dr. Zollikofer displayed exceptional ability in the development of new ideas and their technical realization. His contributions to the technical press were numerous and valuable and covered a wide range of subjects, including water gas plant, the carburetting of coal gas, tar distillation, water heaters, and the history of the Swiss Gas Industry.

When he returned to Switzerland, in 1878, he entered the employ of Sulzer Brothers, with whom he remained until 1894, and he was responsible for the erection of a number of gas-works in Switzerland and other countries.

From 1894 to 1899 he was manager at the Metz Gas-Works, again returning to Switzerland in 1899 to become manager at the St. Gallen Gas-Works, where he remained until his retirement in 1920.

Dr. Zollikofer was a pioneer of high-pressure gas transmission, having conceived that it would reduce the cost of gas distribution. This principle was first employed by him at the Metz Gas-Works and later at the St. Gallen Works, both of which are somewhat remote from the towns they serve, and it enabled, subsequently, several outlying districts to be supplied with gas. He was also intimately concerned with the design of the various batteries of inclines installed at St. Gallen.

Through his initiative, a co-operative system for the disposal of by-products, in addition to the purchase of coal, was adopted by the Swiss gas-works. He also played a prominent part in the development of gas appliances.

The services he rendered to the Swiss Gas Industry were recognized by his election, in 1913, as an Honorary Member of the Schweizerischer Verein Von Gas-Und Wasserfachmannern, which he had joined in 1882, and by the presentation of an honorary doctorate by the Technische Hochschule, Zurich, in 1923.

Death of Stanley Grady

STANLEY GRADY, secretary and sales manager of Roberts & Mander Stove Co., Philadelphia, Pa., a member of the American Gas Association and widely known in the gas industry, died May 6.

Before joining the Roberts & Mander Company, in 1911, he was sales manager of the Public Service Electric and Gas Company, Camden, N. J.

Mr. Grady was a member of the former National Commercial Gas Association, and continued as a member of the present Association. He was a charter member of the Pennsylvania and New Jersey Gas associations, and also belonged to the New England and Southern Gas associations. During his career he served on many of the more important committees in these organizations as chairman and otherwise. He had been on the Entertainment Committee of the Pennsylvania Gas Association for more than fifteen years. At the time of his death he was vice-chairman of the Governing Committee of the Gas Range Institute, and a member of the Managing Committee, Manufacturers Section, American Gas Association.

Applying Research in Practice

IT is gratifying to report that the work of the A. G. A. Research Committee in developing the direct gas glost firing process at Rutgers University and at the Lenox Potteries in Trenton is bearing early fruit.

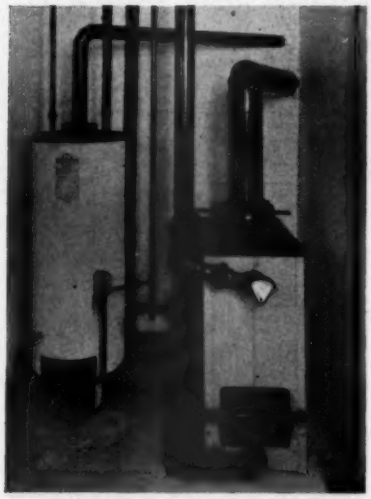
H. C. Weller, of the Natural Gas Company of West Virginia, recently sent sample salt and pepper shakers to Association Headquarters made in a direct fired kiln which he has recently redesigned along the lines developed during this research. This is probably the first application as a result of this research of the new convected gas heat principles which have been developed for table ware.

Mr. Weller reports that the kiln is fired with individually controlled nozzle mixing burners and that excellent results are being obtained on all kinds of ware.

Comparison of the work with the products being fired in the original research kiln at Trenton shows that it is a very good grade of glaze. A very fine, almost microscopic pitting is observed in a few places, but otherwise the glaze appears perfect. Undoubtedly the further experience in this plant with this type of firing will eliminate this difficulty.

Mr. Weller is to be congratulated for his energy in so quickly adapting the findings of the Research Committee to practical application in this installation, which is the second direct fired convected gas heat tableware ceramic kiln to be placed in use in a large pottery.

Washington Develops Use of Gas in Homes



Gas furnace and water heating installation in Washington home

AN interesting development in the use of gas for all domestic purposes has been brought forth by Waverly Taylor, incorporated, and the Washington Gas Light Company, in Washington, D.C.

Waverly Taylor is the developer of the Washington suburb, Foxall, a community of moderately priced homes. This concern has built and sold nearly 100 homes, of which about forty are heated by gas with either Bryant or American Radiator Company's Ideal gas furnaces, and water heaters, while several are equipped with Electrolux gas refrigerators, and all of them equipped with either Detroit Jewell, Oriole, or Magic Chef gas ranges.

The model home on exhibition May first is a semi-detached English home of eight rooms. The gas furnace and water heater occupy a minimum of space in a single room in the basement. This allows the basement to become, in every way except for cooking, an apartment of utmost convenience, containing a living room, finished in stained, knotty pine, a sleeping room, which, according to the builder's suggestion, can be comfortably fitted out for two, and a complete bath with shower.

The homes can be heated during an average winter for approximately $125 while in the majority of cases this has been accomplished for about $100. Aside from this, there is extra space, which could never be utilized with coal, the quiet and convenience of service which could not be had with oil, while the cleanliness and absolute freedom from care of the furnace is a great improvement over either of the above mentioned fuels.

Recreation and living room in Washington home, made possible by use of gas heating equipment

Japanese Engineers Call At A. G. A. Headquarters

A. G. A. Headquarters received a visit May 10 from two gas engineers en route from Europe to their homes in Japan. Kiyoshi Ito, manager of the department of distribution, Tokyo Gas Company, and Hisashi Mori, gas engineer of the Keihin Coke Company, Yokohoma, expect to examine details of American gas practice as they cross the continent to the West Coast. Both joined the Association as individual members and procured a large supply of A. G. A. publications. The visitors brought a letter of introduction from T. Watanabe, chief engineer of the Tokyo Gas Company.

Notice!

We are anxious to locate the man in the gas industry who has performed the most meritorious deed during the period beginning July 1, 1933, and ending June 30, 1934. Help find this man that his deed may be officially and properly recognized at the Convention in Atlantic City next October. He will receive at that time the beautiful American Gas Association Meritorious Service Medal. Applications are due at A. G. A. Headquarters on or before August 1, 1934. Details of this Award will be sent on request.

T. J. Strickler Elected

T. J. STRICKLER, vice-president and general manager of the Kansas City Gas Company, Kansas City, Mo., was elected a director of the United States Chamber of Commerce at the annual meeting in Washington, D. C., May 4. He had the enthusiastic support of members of the American Gas Association.

Major Strickler is representing the seventh district, which is composed of eight States—Missouri, Kansas, Oklahoma, Texas, Arkansas, Louisiana, Colorado and New Mexico.

This is the first time that the Kansas City territory has been represented on the board of the United States Chamber and Major Strickler's election is regarded in that district as a distinct honor. He has been active in A. G. A. affairs for a long while and now is serving as a member of the Managing and Advisory Committees of the Natural Gas Department.

P. U. A. A. To Meet June 19 in New York City

THE annual convention of the Public Utilities Advertising Association will be held at the Pennsylvania Hotel, New York, June 17-20, in conjunction with the meeting of the Advertising Federation of America.

Donald D. Parry, advertising manager of the Central Hudson Gas and Electric Corporation, Poughkeepsie, N. Y., is chairman of the program committee. Other members of his committee are Cyril Nast, Consolidated Gas Company of New York, J. R. Pershall, Public Service Company of Northern Illinois, Chicago, Louis D. Gibbs, The Edison Electric Illuminating Company of Boston, and R. S. McCarty, The Philadelphia Company, Pittsburgh.

Howard F. Weeks of the Consolidated Gas Company of New York is chairman of the arrangements and entertainment committee.

One of the features of the program will center around the awards in the Better Copy Contest. Winners recently announced show that gas companies more than held their own in a field of forty-one entrants.

Three out of four awards for the best general utility advertising went to companies featuring gas ads, second prize and honorable mention being captured by the Central Hudson Gas and Electric Corp. of Poughkeepsie, N. Y., and honorable mention also going to the Union Gas and Electric Co., Cincinnati.

Under the classification of campaign advertising, the highly effective house-heating campaigns of The Peoples Gas Light and Coke Co., Chicago, and the Consumers Power Co., Jackson, Michigan, carried off second prize and honorable mention, respectively.

Other prizes awarded were, Gas Window Display: First prize and honorable mention to Consolidated Gas Company of New York; second prize and honorable mention to Kings County Lighting Co., Brooklyn, N. Y. Gas Newspaper Advertising: First prize, Central Hudson Gas and Electric Corp., Poughkeepsie, N. Y.; second prize, Community Natural Gas Co., Dallas, Texas; and honorable mention to Union Gas and Electric Co., Cincinnati, and Washington Gas Light Co., Washington, D. C.

Honorable mention was also awarded to the Consolidated Gas Company of New York for its outdoor billboard advertising.

The convention program divides itself into two divisions, the first presenting what may be described as an "outside" viewpoint on utility advertising problems, and the second presenting the "inside" viewpoint, dealing more definitely with the specific techniques of successful advertising, geared to local situations.

The morning session on Tuesday, June 19, giving the broader perspective on utility advertising work, the view from "outside," is nevertheless intensely practical, because each of three speakers is familiar with the advertising field, the public utility business, or both.

The first speaker on the morning program will be Pattie Field, formerly Vice Consul at Amsterdam, Holland, now of the Research Department of the National Broadcasting Company who will discuss the subject of "How To Buy Time and Plan a Program To Get the Most from Your Dollar."

The second speaker of the morning is Floyd W. Parsons, whose discussions of economic and political conditions appear regularly under the heading "Everybody's Business" in *"Advertising & Selling"* and *"Gas Age-Record."* He will discuss "Building Public Confidence Through Utility Advertising."

For the final place on the program, the program committee invited Carleton W. Spier of Batten, Barton, Durstine & Osborn who will discuss "Public Utility Advertising From the Viewpoint of the Copy Writer."

The afternoon program has been designed to provide a clearing house for ideas on utility advertising which have already been tried and have proved successful. This program will be built around the "Better Copy Contest." Following the presentation of the awards, some of the leaders in the field responsible for the advertising recognized by these awards will discuss the aims, the methods and the results of their advertising operations.

At this afternoon session on June 19, routine business of the Association also will be transacted and election of officers for the coming year will take place.

In recent P. U. A. A. conventions, the programs have been carried forward into a second day, but this year the sessions have been condensed into a single all-day session. The principal reason for this change has been to permit members to attend some of the other departmental sessions which offer ideas and information valuable to utility advertisers. This year it will be possible for the P. U. A. A. members to attend the entire meeting of their own association, and still have the opportunity to get in on departmental sessions for such groups as the direct-mail, motion picture, radio broadcasting and other departmental groups representing media frequently used by utility advertisers. These departmental meetings, together with the unusually comprehensive and interesting programs planned for the general sessions, provide in total an opportunity for continued professional education to the utility advertiser that he will not frequently find. In view of this opportunity, the officers of the association are confident of a larger attendance at the New York convention than at any held in recent years.

Largest Naval Air Base Equipped with Gas

THE hangar for the air monster, U. S. S. Macon, dominates the 1750-acre naval air base at Sunnyvale, 1000 acres of which came to the government as the gift of communities around the San Francisco Bay, and 750 acres by purchase. This five-million-dollar airship base is said to be the finest naval air depot of any in the world, with regard to buildings, equipment, and living quarters, well laid out grounds, lawns, trees, shrubs and general setting. The hangar is said to be the largest building in the world without pillars or columns. It measures 1117 ft. x 308 ft. over-all and is 194 ft. tall.

Second in importance in this group of buildings is a two-story plant for the storage and repurification of helium gas for the ZRS-5 (the Macon).

The base layout also includes: A power plant, administration building, aerological station, gas cell storage and repair depot, warehouses and refrigeration building. Other departments include a commissary, mess hall, cafeteria, laundry, garage and fire station, incineration plant, ammunition magazine, dispensary and hospital, in addition to a recreation building, residences and barracks for 500 officers and men.

Gas is used at the Naval Air Station at Sunnyvale for all heating and cooking purposes, according to "Gas News," published by the Southern California Gas Co. Two 125-h.p. fire tube boilers generate steam for the radiation and hot water heating of the five industrial buildings, cafe and shops in the airship hangar. The industrial buildings are heated by cast-iron radiation. In the hangar cast-iron radiation is provided for the offices, and unit heaters are used in the various shop spaces. Water heating in the industrial buildings is of the coil-heated storage type with thermostatic regulation. Hot water for the hangar wash rooms is provided by direct mixing heaters. The condensate is returned by gravity and booster pump to a central hot well in the boiler plant, thence to the boiler feed water heater.

ILLINOIS PUBLIC UTILITY ASSOCIATION

B. J. Mullaney, vice-president of The People's Gas Light & Coke Co., Chicago, and former president of the American Gas Association, has been re-elected president of the Illinois Public Utility Association.

Sales Experiences

Compiled by Sales Experience Committee, Industrial Gas Section

More Good Examples of Selling Industrial Gas

"No Particular Advantage Over Oil"

Obviously it would not be proper to name the contributor of a sales experience where the gas man has written "No particular advantage over oil." Nevertheless, when this sale was analyzed carefully, it turned out that there were good reasons for using natural gas for refining aluminum which this large foundry appreciated, even though the cost of using oil at 5¼ cents per gallon was less than the cost of using gas.

The engineering service on furnace design, the advantage of automatic proportioning of air and gas provided for this refining furnace, as well as the successful application of gas to other operations in the same plant were the deciding factors which prompted the use of gas in this new installation. A maximum of 8000 B.t.u. per hour of 1000 B.t.u. gas will be used at an average rate of 48 cents per MCF.

The modesty of the gas salesman who felt there was "No particular advantage over oil" when the results in his prospect's plant had already amply convinced the management that gas was a desirable fuel is food for considerable thought. The sale of gas in this installation in spite of himself is an object lesson that ought to lend courage to other industrial gas salesmen starting out to secure new business in the face of apparently severe competition. This situation is only one of many where the customer will use gas when the contact and the past service rendered by the gas company are such that the customer wants to use gas wherever it is possible.

Merit, Not Reciprocity

Although the National Telephone Supply Company of Cleveland has long been engaged in manufacturing electrical supplies, this fact did not influence its good judgment in applying gas to a new galvanizing pot.

A. T. Code, assistant manager of the industrial department of The East Ohio Gas Company, writes that diffusion flame burners with low-pressure air are being used under this 8-foot galvanizing pot. Natural gas at 70 cents per thousand cubic feet has successfully met the competition of coke at $6 per ton and electricity at 1½ cents per kilowatt hour.

Particular advantages over coke were the ease of control with gas, the reduction of the dross loss and a considerably longer life for the galvanizing pots. And when compared to electricity, gas had the advantage of a markedly lower first cost, a lower operating cost, and a lower estimated maintenance cost.

Consequently two sets of congratulations are in order; to the National Telephone Supply Company for their judgment in purchasing on merit and not on reciprocity, and to The East Ohio Gas Company for their success in heating a galvanizing pot with the diffusion flame type of burner, thus demonstrating again the advantages of gas in this field.

"Go Sit on a Tack"

If setting tacks on chairs were their sole use, quality and uniformity might not be so important. But tacks are needed by the carpet layer, upholsterer, roller shade maker, and for such purposes uniform anneal and bluing are most important.

Consequently, when the Atlas Tack Corporation decided to replace its indirect fired oil annealing furnaces with gas, it found that not only was the quality of the goods improved considerably, but the actual fuel cost was lowered because it was possible to fire directly with gas.

Stuart F. Morgan, superintendent of utilization of the New Bedford Gas & Edison Light Company, states that gas at 83 cents per MCF (540 B.t.u.) successfully replaced oil at 6 cents a gallon, in a revolving type furnace 12 feet long and 14 inches diameter, used for annealing and bluing of tacks and rivets.

The essential difference with the gas burning system using low pressure proportional mixers was that it enabled direct firing to be employed, thereby lowering the fuel cost, and it also provided better flexibility to meet varying demands.

And so we say, sit assured that tacks have reached the ultimate in quality.

Is Modesty the Best Policy?

Many of our gas salesmen apparently believe that it is. Consider a situation where the gas company is called upon by a customer making bottle stoppers to solve the problem of keeping a vigorous flame directed downward on bottle caps as they pass through the machine. The gas company engineer determines that special Ensign-Reynolds burners with blast tips and an Ensign-Reynolds gas compressor could be used in such a way that excellent results are now obtained. The pressure burners installed in the bottle machine, burning downward, could provide more heat than could be obtained from an ordinary atmospheric burner, and as a result there is another satisfied customer on the gas company lines.

Then, in all due modesty, the engineer writes to the American Gas Association, "No particular sales angles were involved in making this sale, except the designing of the special burner to be used."

The gas industry does not need to be modest about the services it can render to customers. The fuel which we have is so flexible and adaptable that we should never feel reticent about advertising what we can do. Let us get some more bottle stopper business.

Believe It or Not

There are people who use residues from calcium carbide after they have made acetylene from it. We did not believe it until we had this interesting sales experience reported by J. H. Gumz, of the Pacific Gas and Electric Company, San Francisco.

It seems that a company in San Francisco has a rotary lime kiln which uses about six million cu.ft. of 1,100 B.t.u. natural gas per year just to make lime from carbide residues. Oil at $1.09 per barrel was the competing fuel, but gas at 19 cents per MCF burned in Natural Gas Equipment kiln burners firing into a Dutch oven proved to be more economical. In addition to this, the greater convenience of gas and its low overall cost made it the desired fuel in this particular job. While at first some difficulty was encountered in obtaining enough heat, it was found that simply adding sufficient burner capacity solved the difficulty.

Railroad Tie Plates

More and more gas installations are being made with light weight refractories which reduce the time of heating and the cost of heating as well. The theory underlying their use is simple, since less heat is required to bring a furnace up to the required temperature when the refractories are light in weight. Yet some engineers have been hesitating to try these on any wholesale scale because of a feeling that fuels such as oil and coal could use such materials to equal advantage.

M. H. Washataugh, industrial gas salesman of the Equitable Gas Company, reports an interesting situation in the Dilworth-Porter Division of the Republic Steel Company, where natural gas is now used for heating railway tie plates prior to cutting and punching. The use of light weight refractories has reduced the time of heating up the furnace from three hours to the almost unbelievably short time of twenty minutes. The plates are more uniformly heated, the production has been increased 50 per cent, and the furnace requires less attention than before. Although oil is available at 2½ cents a gallon, 1130 B.t.u. natural gas at 40 cents per M cu.ft. shows savings of $16 a day because of the factors which have been outlined above.

Direct oil firing cannot be used with this type of light weight refractory because it would cause the refractory to break down in too short a time.

The gas equipment used is a McKee piloted end Series F pusher type reheating furnace, operating at a temperature of about 1500° and using a maximum of 11,000 cu.ft. of natural gas per hour.

Influence

A salesman could hardly be criticized if he could not sell gas in a plant where the management was so convinced that oil was cheaper than gas that they would not even permit a competitive test to be undertaken.

E. W. Williams, industrial gas salesman, found himself in this position, but because of the harmonious cooperation between sales and executive departments of the Equitable Gas Company, a conference was arranged with the management of the Westinghouse Air Brake Company. As a result of the conference, permission was given for a comparative test.

Gas at 38.8 cents per M cu.ft. (1130 B.t.u.) was shown to be 26 per cent cheaper than oil at 2.65 cents per gallon for baking cores at the Wilmerding, Pa., plant. Gas is used in six Coleman core ovens, 13½ x 7½ x 5½, equipped with 1½" McKee No-Blow blast tip manifold burners and low pressure proportioning mixers.

Besides the advantage of lower fuel cost, the gas ovens resulted in a quicker bake, cleaner and stronger cores, and better working conditions in the core baking department. Furthermore, it was observed that the cores washed better when fired in the gas ovens. With an estimated hourly gas consumption of 9000 cu.ft. of natural gas, close to 6 million cu.ft. will be used per year in this new industrial gas installation.

Revival

The apparent revival of activity in the varnish business, coupled with the fact that some of the newer varnishes require close temperature regulation, seems to make it probable that gas companies will be able to enjoy a greater load in this field than they have in the past. According to W. D. Relyea, industrial fuel representative of the Public Service Electric Gas Company, gas has decided advantages over oil in varnish cooking. Not only is the investment in equipment lower with gas than with oil burners, but the firing can be more easily controlled with gas.

Consequently, it is not surprising that Mr. Relyea has sold a new varnish cooking installation which is estimated to use 378 million B.t.u. per year. Oil varying in price between 6 and 11 cents per gallon, depending on the type of burner used, was formerly employed in this plant, but now the varnish kettles are heated by manufactured gas burned in soft metal burners manufactured by the American Gas Furnace Company.

A one-valve control system is used, and the costs at 95 cents per M cu.ft. have worked out very favorably. Heat transfer is effected by radiation as well as by convected heat, and the burner is so set in a pit that it is extremely easy to regulate the temperature, which is most important with the newer types of varnishes. This particular plant has enjoyed the advantages of gas company service for a period of years, and appreciates the low maintenance cost which this indicates.

Trouble

The Nettleton Steel Company, in Cleveland, was having trouble. They were heat treating steel parts with an inferior grade of oil which was costing about 5¼ cents per gallon.

Fortunately, the East Ohio Gas Company makes regular and frequent calls on prospects, regardless of the fuel that they are using. Consequently it was not surprising that one of these calls coincided with the period in which unsatisfactory heat treating was resulting from the oil equipment.

A. T. Code, assistant manager of the Industrial Department of the gas company, states that gas is now used in a Strong, Carlisle and Hammond oven furnace with North American elbow type burners. At 65.5 cents per M cu.ft., close to 6,600,000 cu.ft. of natural gas has been estimated as the annual consumption.

At the risk of repeating what has been said before, this sale exemplifies the advantage of good gas company service, ease of control, cleanliness and an adequate supply of fuel at all times.

Re-Orders Are Real Orders

When a satisfied customer wants another appliance of the same kind he has already installed in his plant, we have a sales experience that is both pleasurable and profitable.

In July, 1933, a manufacturer of small metal parts installed a Surface Combustion atmospheric air heater to provide 180° drying air for his Tolhurst centrifugal dryers. Formerly this manufacturer used steam in coils, and passed air over the coils, which heated it to about 120°. Steam was used on the fifth floor and was supplied from an oil-fired boiler in the basement.

In spite of this uneconomical arrangement, W. F. Kimball, industrial engineer of the Cambridge Gas Light Company, who sold this installation, states that cost of operation was not a real factor in this sale. Better and faster drying was secured from the higher temperature air supplied by the direct-fired dryers, and at a rate of 70 cents per M cu.ft. of 530 B.t.u. gas, the customer was so well pleased that in February, 1934, a duplicate installation was ordered and installed.

Perhaps some would consider it a small job, but when it is realized that 250,000,000 B.t.u. will be used per year from this one operation, it appears that small jobs may not be so unimportant after all.

Oil Goes Out Again

The Reed Baking Company, Philadelphia, is in the business of baking cake, pies and other food products. But from the results they obtained with oil, one might have suspected they were in the carbon black business. The hearth and top of the baking chamber were entirely covered with carbon black, some of which would be deposited from time to time on the food products, resulting, according to the manufacturer, in much waste, but possibly according to the customers, in poor taste. The floor surrounding the oven was kept covered with sawdust to absorb leaking oil from fixtures and burner drips.

A superficial examination of the cost of using oil at 6½ cents per gallon might show that oil was cheaper than gas. However, Frank H. Trembly, Jr., supervisor of the Industrial Department of The Philadelphia Gas Works Company, reports that the final results when this 14-foot rotary bake oven was converted to gas showed that gas at 83 cents per M cu.ft. of 530 B.t.u. gas was much more economical in the long run. Increased cleanliness inside and outside the oven, elimination of rejects, facility of operation, and elimination of the oil fire hazard were important advantages gained in the changeover from oil to gas.

Four 1½" venturi nozzle burners, using a maximum of 900 cu.ft. of gas per hour, fire under the hearth of this oven.

ACCOUNTING SECTION

The Life Story of an Order*

By W. J. ADAMS

East River Gas Co., Long Island City, N. Y.

WHILE the procedure of issuing, executing, and filing orders may not be the same in all gas companies, it is true that when service is to be rendered to a customer, some sort of order must be issued and some sort of method adopted to furnish information of the results. These results of the work done not only affect the service in some way, but they also cause a change some place in the accounting records.

This article is not prepared for the purpose of describing what records are kept of the information furnished by the orders. Rather it is to explain how the orders may be issued, how they may be controlled during their progress up to the time of filing, and how they may be filed.

It would be impossible to describe here the many kinds, sizes, and colors of orders used by various gas companies. Therefore, only the particular style of order used by one company in connection with the following classes of work will be mentioned:

1. Set or Unlock Meter.
2. Lock or Bring in Meter.
3. Collect Bill or Lock Meter.
4. Bookkeeper's Order to Investigate.
5. Miscellaneous Order.
6. Exchange Meter.
7. Leak.
8. High Bill Investigation.

How Orders May Be Issued

All orders for the various classes of work listed with the exception of Exchange Meter (6), Leak (7), and High Bill Investigation (8), are issued on a combination order in strip form. These combination orders serve the requirements of any order to which reference is made, excepting the three mentioned, and are set up in strip formation—that is, they are attached in vertical order. The particular strips in mind consist of five orders attached vertically with a perforated line separating one from the other. The duplicate orders are similar. These forms are furnished with a one-copy carbon paper inserted between the original and duplicate strips.

When an order for any class of service is received orally, a "Request for Service" form is filled in. A "Request for Service" form is not filled in when the request is received by means of a written communication, as then the order is issued directly from the communication. Neither is a "Request for Service" form filled in when application for gas service is being made and the application blank has been signed. In cases of this kind, the information supplied on the application form gives the details necessary to issue the order directly from the application to supply service. This also covers the discontinuance of service at a former address when it is a case of moving from one place to another on the lines of the same company.

The exceptions spoken of, namely, Exchange Meter, Leak, and High Bill Investigation, are issued on individual orders because of the specific information as well as the distinction required. These orders are prepared in duplicate form and set up in pads. Ordinary carbon paper is used in writing these orders.

Method of Writing Orders

As all orders are typewritten, Request for Service Forms, Applications, and written requests from customers are transmitted to the commercial department, service division. Here the orders are typed. (It might be well to mention that when orders were written by hand, occasionally there was some delay in completing the orders because of illegibility.) The time received is recorded on every order.

Orders Temporarily Filed Pending Completion

When the orders have been typed, they are listed according to order number, and the lists, together with the original orders, are delivered by messenger to the customers' service department where the orders are checked against the list. Then the list is signed and returned to the service division. The orders are time-stamped in the customers' service department to indicate the time they were received from the service division. The duplicate orders remain in the service division where they are arranged in geographical order according to street or avenue, and house number, and placed in a "Suspense" or "Tickler" file. This file indicates at any time what orders the customers' service department has for attention.

When the orders are received in the customers' service department, they are arranged according to route, listed on duplicate route sheets, and temporarily placed in a route file. Route sheets are prepared to show according to geographical location the orders that have been assigned to employees. The name of the district employee receiving orders for a particular route is recorded on the route sheets. The original copies are held in the customers' service department and the duplicate copies given to the service division so that they will know what orders are on the district to be completed.

Easy accessibility to this information facilitates matters in replying to customers' inquiries in relation to orders which are in the process of completion. The request for service forms from which the orders have been typed are bound and temporarily filed according to date for a period of thirty days. At the expiration of this period they are discarded. Letters and postal cards are filed permanently in alphabetical order according to name. Applications are filed temporarily awaiting the return of the completed orders involved.

Progress of Orders

When the call is made at a customer's premises for the purpose of fulfilling the requirements of an order, the time of the call is recorded on the order. This is to indicate exactly the period which elapsed from the time the order was issued until the call was made at the customer's premises. At the end of every day the district employee turns in to the customers' service department all orders that were assigned to him.

The route sheets are then checked with these orders and the necessary information recorded. Incompleted orders are routed again for further attention. The completed orders are listed and sent to the service division where the lists are checked, signed, and returned to the customers' service department. The original orders are then matched with the duplicate copies and both copies are stamped—"Received from the Customers' Service Department, and Date Received."

Orders requiring no further attention are filed, the original order according to street or avenue and house number in one file and the duplicate order according to number in another.

Applications on file awaiting the return of orders are withdrawn when the orders involved are received, and together with the orders are given an application number. These and all other original orders are transmitted to the bookkeeping division and the duplicate orders are placed in a suspense or tickler file indicating where the orders are being held.

* Contribution of the Customer Accounting Committee.

Filing of Orders

When the required information has been recorded from the orders held in the bookkeeping division, the orders are returned to the service division where they are matched with the copies from that section of the file in which they were held pending the receipt of the original orders from the bookkeeping division. The original orders are filed according to street or avenue and house number in one file and the duplicate orders according to order number in another file. It will be seen that if all classes of original orders are filed together according to geographical arrangement, orders representing all the work done at any particular premises can be withdrawn conveniently from the file.

The duplicate orders in the suspense or tickler file are examined at certain intervals to ascertain if any of them are outstanding for an unreasonable length of time. Whenever this is found to be the case, an investigation is made to ascertain the reason for the delay and steps are taken to improve the condition.

Combination Order in Strip Form

If orders are typed, it is well to consider using a combination order in strip form so constructed as to accommodate information that will cover any phase of work as it is obvious that much time is saved when it is not necessary to remove one form from the typewriter to insert another. If orders are handwritten or typed through an intercommunicating message-recording system, it will be found necessary to use a strip or continuous form of order.

Accurate Field Records—A Necessity in the Administration of Natural Gas Properties*

By J. C. CHISLER

Hope Natural Gas Company, Pittsburgh, Pa.

IN order to appreciate the necessity for accurate field records and the extent of the organization necessary to maintain them, it might be well to consider first a brief historical record of the development of the natural gas industry, its extent at the present writing, and some of its characteristics which have a distinct influence on the type of records and organization required.

The history of the industry is briefly summarized in the following comparative and statistical manner:

The natural gas industry is the only large scale mining business which must be conducted largely under public utility regulations. Our industry had its beginning at Fredonia, N. Y., in 1821. Great strides have been made since that time. The first gas well in Pennsylvania was drilled to a depth of 700 feet, near Centerville, in 1840. The deepest natural gas producing well in the world was completed on November 27, 1924, near Latrobe, Pa., at a depth of 7,740 feet.

The first iron gas pipe line in the United States was a 2-inch one, about five miles long. This line was completed into Titusville, Pa., August 1, 1872. A steel pipe line 24 inches in diameter and about 900 miles in length was delivering gas from Amarillo, Texas, to Chicago, Ill., October, 1931.

The first natural gas compressing station was built in 1880 at Rixford, Pa. It was a 400 H.P. installation and had a daily pumping capacity of five million cu.ft. One natural gas company station at Hastings, West Virginia, is a 29,200 H.P. installation and has a daily gas compressing capacity of 360 million cu.ft.

The first gas meters were used in 1888. In 1932, one trillion, five hundred eighteen billion cu.ft. of natural gas passed through meters.

The first carbon black plant was built at Gambier, Ohio, in 1885. In 1932, there were fifty plants, with annual production of 258 million pounds.

The first plant for the recovery of gasoline by the compression process was that of Andrew Fasenmyer, built in 1904, almost on the site of the original Drake oil well. The first plant for the recovery of gasoline from natural gas by the oil absorption process was built at Hastings, West Virginia, by the Hope Natural Gas Company in 1913. The first charcoal absorption plant for recovery of gasoline was built in 1919 at Lewis Run, Pa. Natural gasoline production in 1932 was one billion, five hundred two million gallons. The first commercial plant for the recovery of liquefied petroleum gas and petroleum ether products—propane, butane, etc.—was built by the Hope Natural Gas Company at Hastings, West Virginia, in 1918. In 1932 the industry produced and marketed 33,630,000 gallons.

The presence of helium in natural gas was first established by Cady & McFarland, in 1907. The first commercial plant for the extraction of helium from natural gas was erected at Ft. Worth, Texas, in the spring of 1918. Within the period April, 1929, to May 1, 1933, fifty-one million cu.ft. were produced.

Record of Progress

Farseeing men in the industry have been responsible for the maintenance of records from which these historical data have been taken. New industries possess a similar historical record of achievement and progress.

The present day natural gas industry may be likened to a great organism made up of many diverse and indispensible parts. The general office is the heart, the field organization is the system of arteries through which the life blood of the industry is delivered to the capillaries, and each employee is a capillary. The whole life of the industry is dependent upon each employee meeting his responsibility. There is no break in the continuity of the flow of the life blood in this organism. This continuity is maintained as a result of highly coordinated effort. This coordinated effort comprehends the closest contact between the general office, field and employee. This intimate contact is maintained solely through the accurate records kept in the field of every activity of every employee. It is impossible to overemphasize the important part that true records of the employees' activities play and the great influence which the reports exercise upon the successful management of a natural gas business. It is a truth generally recognized that the foundation of every successful enterprise is a knowledge of the enterprise based upon accurate data—historical and statistical.

The nature of the natural gas industry is such that the properties of the average producing company extend in small units over a wide expanse of territory. This is necessary in order to maintain gas production. This fact, combined with the manifold ramifications of the industry, makes the task of preparing and collecting accurate data covering all phases of the business more difficult than for concerns in other lines of endeavor where the properties are more centralized.

Practical considerations necessitate that natural gas properties be operated and arranged in working districts. Each working district has its own superintendent and field clerk to supervise and care for the operation of all properties within the district.

The district office is the clearing house between the general office and the field. It transmits instructions from the general office to the field and information regarding the field's activities to the general office. The field clerk is the clearing house agent. He must assemble, sift out and orderly arrange all details of the

*Contribution of the Office Management Committee.

activities in his district for transmittal to the general office. He is required to prepare and forward currently or monthly: (1) an accurate record of all employees' activities in his district; (2) time books and payrolls, showing the name of each employee, occupation, rate and amount of time spent on each job; (3) material reports covering movements of all materials from one location to another; (4) connection and disconnection reports covering gas supplied for drilling wells, cleaning out wells, domestic and free consumers; (5) teaming and trucking payrolls; (6) inventory of drilling and cleaning out tools; (7) monthly report showing the status of all new work in progress; (8) reports covering drilling and cleaning out wells; (9) monthly reports showing the status of all operating wells in his district. He must maintain individual files for each unit of investment, such as lines, wells, compressing stations, measuring stations, etc.

The field clerk must be able to assist the superintendent in planning his work and he must have definite knowledge of field operations and of accounting procedure.

Divisions of Activities

Conditions within the industry necessitate that the activities of the industry be segregated into divisions as follows: (A) Gas Production; (B) Gas Transmission; (C) Gas Distribution; (D) Gasoline Manufacture; (E) Miscellaneous.

In the gas production division of one organization and its associated companies, there are 6,445 producing gas wells on acreage under lease. Seven hundred twenty-three thousand, one hundred and sixty-six acres are in actual operation as source of supply, and 2,344,387 acres unoperated are held in reserve. The essential employees of this division are classed as geologists, leasers, abstractors, rig builders, drillers, tool dressers, well tenders, clean-out drillers and bailing machine operators.

In the transmission division there are 106 compressing stations, of a total horsepower of 140,245. There are 8,727 miles of pipe line, gathering and transmission. The essential employees of this division are classed as mechanical engineers, draftsmen, construction foremen, engineers, oilers, firemen, coal shovelers, ash handlers, water tenders, calorimeter men, machinists, electricians, station repairmen, carpenters and gas dispatchers.

In the distribution division, 631,946 domestic consumers and 871 industrial consumers are served through 7,528 miles of distributing mains. The essential employees of this division are classed as agents, cashiers, contract men, complaint and emergency men, ledgermen, billing machine operators, service men, collectors, meter readers, fitters, pressure control operators, sales engineers, salesmen, inspectors and public relations men.

In order that the work of gas production, transmission and distribution may be carried on in an efficient manner, a personnel of 5,489 trained employees is required and a fleet of 880 automobiles, trucks and tractors is needed. To insure continuity of gas service and close contact between field and general office, 3,737 wire miles of telegraph and telephone system are maintained.

In the gasoline manufacture division, the essential employees are classed as chemists, plant foremen, stillmen, pumpers, firemen and loading men. The operation of gasoline manufacturing plants is a necessity in maintaining service and in providing a clean, dry and uniform fuel.

Miscellaneous employees are those which are common to all divisions of the natural gas business. These are classed as superintendents, assistant superintendents, rights-of-way men, civil engineers, foremen, line walkers, meter engineers, meter repairmen, teamsters, truck drivers, automobile mechanics, warehouse men, pipe machine operators, blacksmiths, welders, gang pushers, rousters, laborers, clerks, stenographers, telephone and telegraph linemen, telephone and telegraph operators.

Field Reports

The field men who actually drill and operate the wells, construct and operate the transmission lines, manage and effect distribution, and are engaged in gasoline manufacture, are busy and have arduous duties; nevertheless, accurate information regarding each day's activities must be transmitted in some form or other to the district field clerk so that he in turn may complete the various forms in use, in order that the general office may have the information which it requires. These reports are very essential—they are the fundamental basis from which the records of the natural gas industry, pertaining both to accounting and operating, are compiled.

The field reports as received by the general office are classified as to operating and accounting. The operating reports, such as drilling and operating well records, volume, pressure and production reports, etc., are turned over to the general operating department. Various statements are made to the management, using these reports as a basis, to aid it in making decisions in regard to drilling additional wells, taking care of or abandoning wells, acquiring additional acreage, surrendering acreage, making extensions and improvements, and for other important purposes. All reports pertaining to accounting are passed along to the treasurer's office. The entire accounting structure is built upon the records as compiled by the field organization. In the case of natural gas utilities, it has become necessary to follow the accounting practices prescribed by the public service commissions of various States. In order to conform with these practices, the accounting records must be complete in every detail.

A continuous book inventory is maintained and this reflects all materials in place as the natural gas plant is operated currently. The inventory shows in detail all items in each unit of investment. The accuracy of this inventory determines its usefulness in rate case procedure. All financial statements to stockholders, all the varied and miscellaneous statements required by the Federal, State and municipal authorities, are fundamentally and primarily based upon the reports of the field organization. It is only through the medium of accurate reports that dependable statements can be made and a safe and sane management of natural gas properties be assured.

In Continuous Service Quarter-Century

John Stilwell

COL. JOHN STILWELL, vice-president of the Consolidated Gas Company of New York, completed twenty-five years of continuous service with that company on May 1.

A graduate of Sheffield Scientific School, Yale University, Colonel Stilwell entered the employ of the Rochester Railway and Light Company as a cadet engineer where he remained until April, 1909. On May 1 of that year, he was employed by the Consolidated Gas Company of New York as a draughtsman and later served as a field engineer. In 1911 he was transferred to the construction department, and in 1912 was engaged in an inventory and appraisal for the Westchester Lighting Company. Later, in the same year, he was appointed engineer of the Meter Department of the Consolidated Gas Company.

In May, 1918, Colonel Stilwell went to France with the Eightieth Division and was later transferred to the Fourth Army Corps. After the Armistice he served six months in Germany as assistant chief of staff of the Fourth Army Corps with rank of lieutenant-colonel.

Colonel Stilwell resumed his duties with the Consolidated Gas Company in July, 1919. In May, 1921, he was appointed superintendent of transportation. Later he became consulting engineer of transportation for The New York Edison Company, The United Electric Light and Power Company, and the New York and Queens Electric Light and Power Company.

For three years, beginning February, 1925, he served as president of the Gas Companies' Employees' Mutual Aid Society, the employee welfare organization.

In April, 1926, he was made executive assistant to the senior vice-president, continuing as general superintendent of transportation. He was elected president of the National Coke and Coal Company in December, 1927, and in the same month was appointed manager of the Personnel Department of the Consolidated Gas Company. On April 26, 1928, he was elected a vice-president of the Company.

COMMERCIAL SECTION

N. T. SELLMAN, Chairman J. W. WEST, Jr., Secretary F. M. ROSENKRANS, Vice-Chairman

House Heating and Conditioning Bibliography

The following articles appearing in trade literature during the first quarter of this year will be of interest to gas house heating personnel.

American Gas Association Monthly ..... Low-cost housing parley endorses gas for heating and refrigeration ..... Jan. 1934 p. 5

Domestic Engineering..... Air conditioning job is operated with gas..... Jan. 1934 p. 50

Domestic Engineering..... This installation is gas fired ..... Feb. 1934 p. 73

Domestic Engineering..... This gas fired air conditioning job points out an untouched market; installation in undertakers' buildings ..... Mar. 1934 p. 81

Gas Age-Record..... Gas serves world's largest public hospital; Los Angeles County general hospital ..... Jan. 13, 1934 p. 33
(All heat and power from gas-fired steam boilers.)

Gas Age-Record..... How service helps to hold and sell house heating... Jan. 13, 1934 p. 35
(Servicing methods of one gas company.)

Gas Age-Record..... Gas industry must stake its claim in 1934..... Jan. 27, 1934 p. 71

Gas Age-Record..... Operation of a gas-fired house heating plant..... Feb. 3, 1934 p. 109
(Continuous record of converted boiler operation for entire heating season.)

Gas Age-Record..... Jersey Central office boasts air-conditioning equipment ..... Feb. 24, 1934 p. 185
(All-year-round circulation of filtered air. Automatic humidification and heating in winter with provision for adding refrigeration or tap water cooling for summertime use.)

Gas Age-Record..... Comparing gas heating costs with every day expenses ..... Mar. 10, 1934 p. 225

Gas Age-Record..... How Laclede sold over 1000 heating jobs in 17 months. Mar. 24, 1934 p. 267

Heating and Ventilating.. Kansas City Art Museum presents special problems in heating and ventilating ..... Jan. 1934 p. 44
(Boiler plant, fan and duct system described. Savings by use of insulation quoted.)

Heating and Ventilating.. Modern Dallas Buildings heated and conditioned by gas..... Feb. 1934 p. 25

Industrial Gas..... Heating and ventilating a large garage—the modern way..... Feb. 1934 p. 18
(Ventilating system designed to remove auto exhaust effectively. Overhead unit heaters use steam from automatic gas-fired boiler.)

Natural Gas..... A Romance of Modern Air-Conditioning ..... Jan. 1934 p. 5
Feb. 1934 p. 32
Mar. 1934 p. 8
Apr. 1934 p. 24
(A series of articles dealing with air and its preparation for use in home and industry.)

Western Gas..... Selling gas heat in the Chicago area..... Mar. 1934 p. 10
(Sales methods and advertising work.)

House Heating and Air Conditioning Home Study Course at Hopkins

A LITTLE more than a year and a half has elapsed since the initiation of the House Heating and Air Conditioning course by members of the faculty of The Johns Hopkins University. During this time the course has enrolled students from all parts of the United States, and one registration has even been received from England. Most of the students are still engaged in the course, and additional students will still be received. Two have already completed the work and will be awarded certificates of that fact.

The preparation of the course went along with the work by the students, and consequently it is only now that a complete copy has been made available for review. The course proves to be very comprehensive and covers both the elements of house heating and air conditioning as well as the more advanced work. It would be a great help to the gas industry if every salesman were familiar with the valuable material this course includes.

The course is the work of John C. Holtz, Ph.D. and Wilbert J. Huff, Ph.D., D.Sc., professor of gas engineering at The Johns Hopkins University.

The lesson sheets are as yet only available in "duplicator" form, but it is planned that if the text is continued, it will be offered in book form at a future date.

The course is intended for the beginner as well as the more advanced worker in house heating, and many of the students who are progressing very satisfactorily have only had high school training. However, it would be easier to follow for those who have had some engineering background. The course covers all of the conventional methods of house heating and air conditioning.

Kitchens of Yesterday and Today Displayed

THE gas kitchen of 1934, completely equipped, was contrasted with the kitchen of Andrew Jackson's time in a window display featured recently by the Sapulpa Gas Company of Sapulpa, Oklahoma. The exhibit drew large crowds and received statewide publicity.

The old-time kitchen was equipped with dark beamed ceiling, brick floor and open fireplace, with pots and kettles actually used when Andrew Jackson was President of the United States. Among the various authentic articles was an iron tea kettle in use when Oklahoma was opened to settlement. Another article of more than usual interest was a family-sized iron pot hung on a hook in the center of the fireplace. It was brought from Virginia to Oklahoma by covered wagon and was one of the pots that boiled on the evening of April 22, 1889, among the tents that became Oklahoma City. A large Dutch oven with cover for live coals and tongs for lifting was part of the cooking equipment carried along by a settler in the historic dash for homes that opened Indian territory and Oklahoma.

Officials of the Sapulpa Gas Company declared that this unique window display attracted more attention than any other display within recent times.

HOME SERVICE COMMITTEE

DOROTHY E. SHANK, Chairman — JESSIE McQUEEN, Secretary

Year's Articles in Women's Magazines

HOME service workers will be interested in the following articles which have appeared in popular and other magazines during the period from June, 1933, to June, 1934:

AMERICAN HOME

July, 1933	Speaking of Cupboards.
August	Budget and Like It.
	Kitchen Gadgets.
October	The Tale of the Tub (Historical—Bathrooms).
	On Washing Woolens.
	Americana in the Kitchen—The Southwest.
	Homemaking Around the Globe—Paris.
November	Homemaking Around the Globe—India.
	Americana in the Kitchen—Celebrated Dishes of the South.
	Dollar Ideas (Household Hints).
December	Homemaking Around the Globe—Alaska.
	Origin of Present Day Architecture.
January, 1934	Homemaking Around the Globe—Caribbean Countries.
	What, No Cellar (Mentions Gas Heat and Water).
	Is There Economy in Doing the Family Wash at Home?
	Accessories before the Food (Kitchen Utensils).
	Americana in the Kitchen (Pennsylvania Dutch Cuisine).
	Your House—Its Care and Repair.
February	Homemaking Around the Globe—China.
	Away With Daily Grime (Cleaning).
	Of Interest to You? (Kitchen Gadgets.)
March	Homemaking Around the Globe—Mexico.
	Is Your Home the Safe Place, You Believe It to Be? (Safety.)
	Cookery History from Circe to Louis XIV.
April	Americana in the Kitchen (Cape Cod Cookery).
	Filing Household Hints and Dollar Ideas.
May	If You Must Dine in the Kitchen.
	Homemaking Around the Globe—Soviet Russia.
	Monday's Oratorio (Laundering).
	Discovered—The Perfect Kitchen.

BETTER HOMES AND GARDENS

August, 1933	Let It Blow (How To Avoid House Heating Losses).
	Come into the Kitchen (Kitchen Plans).
October	Pur on the Pan—The Right One (Kitchen Utensils).
December	Commonest Room Arrangement Error.
January, 1934	What Is this Style Called Modern.
April	Keeping up on Closets.
May	Under the Kitchen Sink.
	Code for Ovens.

COUNTRY LIFE

June, 1933	Making One's Own Weather (Air Conditioning).

DELINEATOR

July, 1933	The New in the News (Kitchen Gadgets).
August	They More than Earn Their Keep (Kitchen Equipment).
September	In Step with the Times (Old and Modern Gas Ranges).
October	Worth Looking Into (Broilers).
January, 1934	"The Sledge Hammer on the Tack."
March	News from Frigid Zone (Refrigerators).

FORECAST

June, 1933	Buying Your House by the Yard.
August	Making Life Easier (Air Conditioning, New Kitchen Equipment and Arrangements).
	Ice Gadgets for the Modern Refrigerator.
September	Story of Food at the Fair.
October	Kitchens of Today (Lewis & Conger Kitchens).
January, 1934	Kitchens Take to Color.
February	Education for Safety in the Kitchen.
March	Notes on Home Heating.
April	Training Girls for Household Assistants (High School Project, Topeka).

GOOD HOUSEKEEPING

July, 1933	Laundering Linens.
	Weatherproof Meals.
August	Canning Days Are Here Again.
	The Kitchen and Laundry at the World's Fair—Stran-Steel House.
September	When Planning Your Meals Let Your Equipment Help You (Refrigerator Meal, Oven Meal, Top Stove Meal and Combination Broiler and Oven Meal, etc.).
	Winter Comfort in Stran-Steel House.
	And Washing Extra.
October	Soaps.
December	Buying Large Equipment (Illustrated).
	Forty-Hour Week for Mother (Leisure).
January, 1934	Bring the Laundry Out of the Shadows.
	Planning the Dream House (Piping and Outlets).
	Design for Spending (Budgets).
February	Gas Savers—Bureau of Standards.
	Laundry Bubbles.
	Are You Satisfied with Your Kitchen?
March	A Boys "Cook Your Own" Party (Gas Range).
	Conditioning the Air We Breathe (Gas Heaters).
May	A Cup of Good Coffee.
	Is Your House Ready for Summer (Cleaning).
	Hurry Up Dinners.
	Free Your House from Its Bond (House Furnishings).

HOUSE AND GARDEN

September, 1933	Lewis & Conger Kitchens.
February, 1934	Modernistic English Residence (Kitchen Has Round Wall).
March	By Courtesy of Old Black Joe (Shows Picture of Early American Kitchen).

HOUSE BEAUTIFUL

June, 1933	A Model Kitchen.
July	The House of Tomorrow.
September	An Office for the Housewife.
November	My Kitchen (Picture of Two Peasant Kitchens).
December	Plastics Enter the Home (Picture of Dahlstrom Cabinet).
February, 1934	Cooking by Clockwork (Gas and Electric Ranges).
	Bright Thoughts for Thursday (Household Hints).
May	An Old Quebec Farmhouse (Kitchen Picture).

JOURNAL OF HOME ECONOMICS

October, 1933	Home Economics in Radio Programs.
November	Overhead Cost of Meals in Small Homes.
December	Electricity and the Family Budget.
January, 1934	Oven Ware and Fuel Economy (Corning Glass).
	Thermal Efficiency of Cooking Utensils as Affected by the Variations in the Area of Their Contact with the Heating Surface (Electric Stoves—Maine).
March	Standard Food Budgets Used by Social Agencies.
April	Standards for Evaluating Research Problems.
May	Changing Home Standards Under the New Deal.

LADIES HOME JOURNAL

July, 1933	Frozen to Your Taste.
August	In the Wash (Laundry Notes).
September	The Tired Housewife (Kitchen Plans).
	A Maguette of Your Living Room.
October	Handbooks are Handy Books.
November	Bathroom Building.
January, 1934	Meeting Kitchen Emergencies.
February	New Homebuilding News.
March	Number One Room (Kitchen).
	Footstep Savers (Kitchen Utensils).
	Perils of Staying at Home (Household Safety).
	Steaming and Steamers.
April	Adventures with a Market Basket.
May	Make the Diet Fit the Pocketbook.
	At Your Service in an Instant (Household Utensils).

McCALLS

July, 1933	Is Your Answer Yes (Care of Refrigerator)?
August	Fast Dyes Refuse to Run.
October	Washing the Silky Way.
November	Within the Hour (Cooking Cheap Meats).
	Monday Morning Line Up.
January, 1934	Woman's Rights to Leisure (Gas and Electric Appliances).
	Going Beyond the Hour (Cheaper Cuts of Meat).
February	A House with Its Eye on the Future.
March	She Likes to Wash and Iron.
April	Kitchens that Work (Utensils).
	See Gas Range Picture on Cover of Homemaking Section.
May	Do You Harbor an Unknown Enemy in Your Home (Household Arrangements)?
June	Hot Platters.
	A Long Life to Blankets.

PICTORIAL REVIEW

July, 1933	Hot Kitchens (Aids for Hot Kitchens).
August	Be a Better Buyer (Science Shows You How to Buy).
	Walls You Can Wash.
September	Be a Better Buyer (Budgets).
	Kitchen Cavalcade.
	Washing the New Cotton Fabrics.
October	Be a Better Buyer (Chicago Fair).
November	Be a Better Buyer (Coffee and Food).
	Autocrat of the Dinner Table.
December	Be a Better Buyer (Lighting).
January, 1934	Be a Better Buyer (Dried Fruit).
February	Keep Appliances Working.
March	Be a Better Buyer (Meat).
April	Be a Better Buyer (Floor and Its Coverings).
May	Be a Better Buyer—Servants for Us All (Gas and Electric Appliances).

PRACTICAL HOME ECONOMICS

June, 1933	Art Is a Factor in Everyday Living (Kitchen Equipment).
	Meal Planning from Welfare Food Lists.
July	The Home as Consumer—Paul Nystrom.
September	Pies and Pie Makers of British Fame (History).
November	Home Economics Is Practical in Sweden (Gas Range Picture).
	Kitchens of Other Days (Heinz Kitchens).
	Do You Know that "Almond Cakes Were Eaten in Ancient Rome" (History)?
December	Planning and Equipping the Unit Kitchen.
	Building Efficient Work Units for the School Cafeteria.
March, 1934	Vocational Home Economics for Relief Agencies.
	Guides in Food Buying.
	Charm of Old Cook Books.
	Do You Know Wedding Cakes Were Made for Early Roman Brides?
April	Boy and Girl Exchange Unit—Girls in the Shop and Boys in the Kitchen (A Course in Kansas City).
	Selection and Improvement of Home Economics School Equipment.
	Home Economics in Germany.
May	Home Economics in Denmark.

SUNSET

June, 1933	Oven Canning.
September	Pointers on Deep Fat Frying.
November	To Which Era Does Your Kitchen Range Belong?
January, 1934	My Favorite Thrifty Recipes (Mentions Cost of Gas).
April	Now Is the Time to "Put Up" Strawberries.
May	News Notes from Western Kitchens.
	Get a Little System (Budgeting).
	Canning Western Fruits.

WOMAN'S HOME COMPANION

January, 1934	Doing Up His Shirts (Laundering).
February	Consider Pie (Historical).
	When HE Cooks.
	Good Form in Business.
	When Sickness Comes.
March	Good Looks in the Machine Age.
	Versatile Utensils.
April	When You Iron.

VOGUE

February, 1934	"Fun in the Bath."

INDUSTRIAL GAS SECTION

Competitive Situation in the Baking Field

By FRANK H. TREMBLY, JR.

Chairman, Food Products Subcommittee, Industrial Gas Section

EVERY gas utility is indebted to the baking industry for a certain percentage of its revenue. For many utilities this represents the largest single commercial or industrial use for gas, aside from the hotel and restaurant field. Until recently, the gas industry has been in a particularly fortunate position, since that portion of this load obtained from conveyor ovens was largely sold through the activities of the oven companies themselves, and required but little sales work on the part of the utility to obtain it.

There recently has been a change in fuel trend in certain important sections of this industry, which as yet has not had a serious effect upon the revenue of the gas utilities. This will become more and more noticeable, and if present conditions remain unchanged, will result in the loss of a considerable portion of this load to other fuels, within the next five- to ten-year period. This situation warrants the immediate attention of the industry, to take effective steps to meet the situation. The following discussion will outline briefly the situation in each division of the baking industry, classified according to types of ovens. Since the fuel application, extent of fuel use, and competitive situation change considerably with oven types, an analysis by type is believed to be the simplest method of approaching this problem.

Conveyor Type Ovens

From a survey made of a number of utilities, the fact was brought out that, in the manufactured gas territories, from 60-80 per cent of the entire baking load was obtained from horizontal and multi-pass conveyor ovens. In the natural gas areas, from 15-20 per cent of the baking load can be attributed to this same type of oven. It is evident that these ovens represent an important class, from the standpoint of present utility revenue.

Due to the difficulty of applying oil and solid fuels to these ovens, gas early became the predominant fuel, and, while for a time electricity became a serious competitor, the development of the indirect-fired gas oven again gave gas the preponderance of new oven construction. Since these ovens were large consumers of gas, using from 500-2,000 m.c.f. of 530 B.t.u. gas per month each, the industry greatly profited by the general acceptance of these gas-fired ovens by the baking fraternity.

About three years ago, the oven manufacturers developed a forced circulation system of heating, using the products of combustion mixed with air, that permitted a most effective heavy fuel oil application, with from 1 to 3 oil-fired air heaters per oven. The high efficiency developed made oil an immediate competitor, since the baking qualities of these ovens were found to be as satisfactory as the previous gas ovens. Whereas from 850-1,250 c.f. of 530 B.t.u. gas were required per thousand pounds of product baked, the oil-fired ovens will bake a like amount on four gallons of heavy fuel oil, costing from 2½-5 cents per gallon. Certain other items are chargeable against the oil operation, but even with the addition of these, the oil oven will produce the same goods at a considerably lower cost than gas ovens, at present average rates.

These ovens attracted the immediate interest of the baking industry, and to date practically all of the larger chain bakeries, as well as many independent bakeries, have installed them, to determine for themselves the actual savings effected. One oven manufacturer reports that, while in 1930 only 6 per cent of his ovens were oil-fired, in 1933 the percentage of oil-fired ovens was 79.1 per cent; another reports that 80 per cent of his tunnel-type traveling ovens in 1933 were oil-fired. When it is realized that only three years ago the new ovens constructed were almost exclusively gas-fired, the seriousness of this trend in fuels can be appreciated. Many of these oven sales represent new installations, but a considerable portion of them represent replacement of existing gas ovens, and loss of utility revenue.

A survey of a number of utilities showed that, in manufactured gas territories, ovens of this type were earning a rate, based on 530 B.t.u. gas, of 48-80 cents per m.c.f., and that, in the natural gas territories (1,000 B.t.u. basis), the rate earned was 24-85 cents per m.c.f. Such rates in the manufactured gas territories will not retain this business against oil competition, where existing ovens are to be replaced through obsolescence. Until a more thorough study is made of the oil-fired circulating heat type of oven, and until the industry has had greater experience with the maintenance costs of these ovens, it will be difficult to estimate what rate will be necessary to retain existing business and obtain added load. Present indications are that such rates would have to approximate holder costs, in many cases, to be effective.

Aside from the use of this new type of oven, large bakeries, particularly in outlying sections, have been found to be especially subject to competition from liquefied petroleum gases. Their large use of fuel, together with the limited number of points of fuel use in the plant, has made conversion of these customers easier than in the cases of the usual industrial customer. The loss of load to these fuels can be controlled through selling the intangibles of manufactured gas operation, and by making rate adjustments to approach the operating cost of such fuels.

Rotary Hearth Ovens

While these ovens were originally coal-fired, their small fuel use (80-100 m.c.f. per oven per month of 530 B.t.u. gas), has made gas the generally accepted fuel. Such ovens comprise from 7-15 per cent of the total baking load of the larger manufactured gas utilities, and from 2-8 per cent of the total baking load for natural gas areas. About 60 per cent of these ovens are gas-fired in the areas served by the larger manufactured gas utilities, and approximately 75 per cent gas-fired for the natural gas utilities.

An investigation indicates that electricity, except in rare cases, is a negligible factor, that the percentage of new coal-fired ovens constructed is decreasing, that the greater portion of new ovens constructed are gas-fired, and that the installation of new oil-fired ovens, or the conversion of existing gas-fired ovens to oil, is increasing at a rapid rate.

The success attending the use of oil on these ovens is largely determined by the grade of oil used and the type of oil burner. Installations made with good burners and using No. 1 or No. 2 fuel oil operate with but little trouble. Due to the expense of making an oil installation for but one oven, it is believed that, where gas rates are 75 cents per m.c.f. of 530 B.t.u. gas, or lower, oil competition need not be feared, but that on multiple-pass installations, gas rates of 50-60 cents per m.c.f. of 530 B.t.u. gas will be required to hold this load against active oil competition.

Considerable improvements in the application of gas to these ovens have been made, and it is recommended that utilities carefully survey their installations of these ovens to make certain that they are operating with proper equipment and at the highest point of efficiency.

Cracker Ovens—Reel Type

In the manufactured gas territories, these ovens are fired almost exclusively with coal or coke, with a few oil-fired installations. In natural gas areas, the greater portion of these ovens are gas-fired, where rates of 35-45 cents per m.c.f. (1,000 B.t.u. gas) are obtainable. Where the operating cost differential between gas and solid fuel exceeds 20-25 per cent, the greater portion of these ovens will be fired with the cheaper fuels. This is due to the large heat requirements (2,500-4,000 c.f. per oven per hour of 530 B.t.u. gas), and to the satisfactory results obtained with other fuels.

To obtain business of this character, it is necessary to establish competitive rates, or materially to improve the present gas heat application to these ovens. It is believed that considerable improvement in gas efficiencies could be obtained, providing the proper effort were made to study the effect on the product of reduced excess air and a different burner application.

Direct- and Indirect-Fired Peel Ovens

In the natural gas areas, ovens of this type constitute from 30-60 per cent of the total gas baking load, while in the manufactured gas territories, only a negligible percentage of these ovens are gas-fired, even though the potential load represented by these ovens is usually greater than the total existing gas baking load.

Due to the heat storage capacity of these ovens, the controllable and combustion characteristics of gas are not of especial value, and no great premium can be obtained, except on the score of cleanliness and convenience. Gas rates of 25-30 cents (530 B.t.u.) would be required to compete with solid fuels, particularly where small sizes of anthracite coal or coke are used, with a blower. In the natural gas areas, low-priced bituminous coal, applied with stokers, has made considerable inroads in this market, and constitutes a major threat against the higher rate gas installations. With the present gas application to these ovens, a rate of 30-40 cents per m.c.f. (1,000 B.t.u. gas) will be required to obtain this business. It is recommended that further study be given to methods of improving the application of gas to these ovens, if we are to retain this business on natural gas and obtain any appreciable quantity of it in the manufactured gas territories. An interesting development was made in Pittsburgh, using the recirculating heat principle, which showed a saving of approximately 50 per cent over the previous method of firing. If this application could be made more simple, it would be of great value to the industry.

Gas-designed peel ovens of the steel-and-insulation type have made but little progress in the baking industry, due to considerable prejudice in favor of the heavy brick ovens, and to the operating advantages offered by the smaller mechanical ovens. These gas-designed ovens have been generally found to be most satisfactory and efficient, and it is recommended that the industry give consideration to their more extensive use in place of the older brick ovens. .

Cabinet Ovens

These ovens are now generally gas-fired, and for the most part the existing ovens are without insulation and heat control, and have three or more decks heated from one combustion chamber. More recently, the gas industry has been selling insulated and heat-controlled ovens, that have received favorable customer acceptance.

In recent years, considerable competition has developed from the electric cabinet oven, that carried with it the definite advantages of individual deck temperature regulation, heavy insulation, and thermostatic control, and that was introduced to the baking industry as producing goods of superior quality to that obtained in other ovens. The gas industry has been slow to develop a similar oven, and there is today but one gas oven on the market that will meet this competition. This type of oven has struck a note of customer acceptance, particularly for restaurant work, which indicates that the former types of gas ovens are obsolete for many classes of customers.

More recently, oil-fired cabinet ovens have been placed on the market, but since they are similar to the original types of gas-fired oven, with a single combustion chamber for a number of decks, improper insulation, and lack of temperature control, it is not believed that these ovens will make much headway, except where there is a general change on the part of the particular customer from gas to oil firing. The small quantity of fuel consumed, and the cost of installation of oil-fired equipment for so small a unit, makes the general use of oil-fired ovens of this type improbable.

Conclusion

From this brief analysis, it can be seen that the gas industry can lose a considerable portion of this load to competition, unless effective steps are taken to offset it. So far as the traveling ovens are concerned, defense methods would consist principally of determining accurately and beyond doubt all of the operating costs that are chargeable against the oil-fired circulating heat oven. While these ovens can also be gas-fired, the replacement of oil with gas, under the present firing arrangement, is impractical, since the overall efficiency of each fuel is about the same.

It is believed that more can be done with other types of ovens threatened by competition, and a further study will be made to determine the best steps to take to improve gas usage to compensate for better applications on the part of competitive fuels.

High Interest Is Displayed In Gas Measurement Course

THE tenth annual Southwestern Gas Measurement Short Course, held at the University of Oklahoma, April 24-26, was regarded by its sponsors as the most successful in the history of the project. With a registration of 390, it was the second largest in point of attendance, being within fifty of the high record attendance in 1929.

In the reorganization of the general committee on April 26, D. C. Williams, Kay County Gas Company, Ponca City, program chairman this year, was elected chairman of the general committee to succeed W. R. McLaughlin, Arkansas Natural Gas Corporation, Shreveport.

Ray Roundtree, United Gas Public Service Company, Houston, was appointed by Chairman Williams to succeed Gilbert Estill, Oklahoma Natural Gas Company, Tulsa, as chairman of the committee for the study of practical methods.

Interest in the class work at the course this year was keenest in the history of the school, and manufacturers' representatives and others identified with the project from its inception, in 1924, declared the results secured this year to be a contribution to the advancement of the industry second to none of its kind.

Registration this year included representatives from seventeen States and four foreign countries. The States represented were the following: Alabama, Arkansas, Colorado, Iowa, Kansas, Louisiana, Massachusetts, Missouri, Mississippi, Montana, Nebraska, New Mexico, New York, Ohio, Oklahoma, Pennsylvania and Texas. The foreign countries were Argentina, Belgium, England and Persia.

A university bulletin containing the technical papers submitted during this year's short course will be issued about July 1. It will be furnished all short course registrants without charge and available to others, on request, at a low price.

New Use for Gas Meter

COMPLAINTS received by Pittsburgh, Pa., police that a man was selling liquid refreshments of an intoxicating nature at his home led to an investigation. According to the *Post-Gazette* they searched every nook and corner and were about to leave when the police inspector sighted two gas meters. He pushed one. It swung around. Inside were three quart bottles of moonshine.

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Modern Gas Kitchen At U. S. Military Academy

By C. H. FRENCH

Manager, Hotel Equipment Department
Standard Gas Equipment Corp.

Battery of ranges, broilers, deep fat fryers and bake ovens now part of equipment in West Point Mess Hall Kitchen

THE installation of gas-fired cooking equipment in the Mess Hall Kitchen at the United States Military Academy, West Point, New York, is one of the most outstanding gas installations made in the past year.

West Point is one of the noted places of interest in our Country and is located about fifty miles north of New York City. The site of the Academy is on the west bank of the Hudson River and in one of the most picturesque spots of the Hudson River Valley. The Academy buildings are situated on a plateau several hundred feet above the river and have a background to the southwest and north of mountains including the famous Crow's Nest and Storm King.

West Point was occupied as a Military Post by the Americans during the Revolution and was strongly fortified. For a time it was the headquarters of General Washington, and in 1780 was under command of Benedict Arnold whose plan to betray it to the enemy was frustrated by the capture of Major Andre of the British forces.

West Point also was occupied as a Military Post after the Revolution and a Military School was established there as early as 1794. In 1802 the Military Academy was organized and West Point designated as the site. The land belonging to the Academy extends over several thousand acres.

There are approximately 1,300 cadets and 150 employees to be cooked for daily and about 100 visitors weekly. Cadets are allowed thirty minutes for breakfast and lunch, and thirty-five minutes for dinner.

Food is brought to the tables on platters and the cadets serve themselves. One waiter serves three tables and there are ten cadets to a table.

Approximately sixty-four cents per day is allowed to feed each cadet. This sum takes care of the food, linen, dishes, and small kitchen equipment replacements and repairs.

Coal and charcoal equipment was used for cooking and baking until it was replaced by the modern gas-fired equipment last summer. The layout of the equipment is in duplex formation in the centre of the kitchen, the same kinds of units being on both sides. When the entire cadet body is at the Academy all equipment is generally

Section of Mess Hall, United States Military Academy

used. In the summer months certain divisions are away doing field work and at these times half or less of the equipment is used as may be required.

The ranges being of the insulated type with thermostatic oven temperature controls. The bake ovens and deep fat fryers are also thermostatically controlled.

Cabinet type bake ovens are used for baking potatoes, macaroni, beans, etc. The bread baking is done in the large ovens in the bakeshop.

The broilers are of the radiant surface combustion type which are recognized as the most efficient type of broiling apparatus. Incidentally six of these same type broilers

Coal ranges and charcoal broilers replaced by gas equipment

were recently installed at the United States Naval Academy, Annapolis, Maryland.

The following data is submitted showing a comparison of cost of operating the Mess Hall kitchen at West Point with the gas equipment as against the former coal installation:

conditions in the kitchen, are features which have received favorable comment.

Since the gas installation in the Cadet Mess Hall kitchen, the new hospital building and a large barracks kitchen have been equipped with the same make and designed gas equipment as used in the Mess Hall.

RECORD OF COSTS TO OPERATE GAS EQUIPMENT

Aug. 25 to Nov. 24, 10:30 A.M. = 91 days and breakfast Nov. 24 — 676,810 cu.ft. gas.

4,200 meals a day × 91 days	382,200
Breakfast 92d day	1,400
300 visitors' meals a week (13 weeks)	3,900
Total meals	387,500

Gas Meals

676,810 ÷ 387,500 = 1.7456 cu.ft. per meal

Gas @ 72¢ per M cu.ft. = $ 00.00125 per person per meal

676,810 cu.ft. Gas × 72¢ = 487.30 Gas Bill to date

Coal cost for like period

400 tons per year @ $ 8.00	$3,200.00
15 tons charcoal @ 25.00	375.00
	$3,575.00

91⅛ days' coal and charcoal = 25.02% of a year.

25.02% × $3,575.00 = $894.46

$894.46 ÷ 387,500 meals = $ 00.00231 per person per meal

Coal 894.46 — Gas $487.30 = 407.16 saving 91 days

$407.17 ÷ $894.46 = 46% saving

Coal range repairs	Averaged $360.00 per year
Estimated gas range repairs	100.00 per year

Those in charge at the Academy are highly pleased with the performance of the gas equipment not only from the standpoint of dollars and cents saving but the increased speed in which the food is produced. The uniformity and quality of the cooking, together with the better working

Installations of this character are good load builders for the gas company and there are many installations of this kind that can be made in various parts of the country if the local gas companies would only go after them.* There may not be a Military Academy but jobs of equal size can be converted to gas in clubs, colleges, schools, hospitals, prisons, and institutions of various kinds, or anywhere that large numbers of people have to be cooked for.

* The Engineers of the Central Hudson Gas and Electric Company, Newburgh, New York, are to be congratulated on the efficient help and assistance given in connection with the West Point installation.

Wanted—

A member for the most exclusive organization of the gas industry in America now having a membership of five! Only one member is admitted each year. He is elected by making the greatest individual contribution toward the advancement of the gas industry. On becoming a member he receives the Charles A. Munroe Award consisting of a substantial financial recognition and a certificate. Applications must be received at A. G. A. Headquarters on or before August 1, 1934. Further information gladly furnished on request.

Two-Way Profit Theme Featured at Show

WHAT the individual plumber can expect from aggressively merchandising modern gas appliances was the general theme of the exhibit of the gas companies in Metropolitan New York at the exhibition held in conjunction with the annual convention of the Master Plumbers Association of New York State, at the Pennsylvania Hotel, April 16-18.

The "Two Way Profit" idea was emphasized. It was pointed out that the plumber who merchandises actively profits, first, from the sale of the equipment, and, second, from connecting it. These ways are open for the plumber: He can sell direct; he can turn in leads to the gas companies; and he can connect the appliances.

An interesting feature of the booth was the display of sales helps which the gas companies offer to cooperating plumbers. The gas companies also showed samples of their advertising which is directed to benefit the plumber.

The following gas companies cooperated in the exhibit: Brooklyn Borough Gas Company, The Brooklyn Union Gas Company, Consolidated Gas Company of New York, Kings County Gas Company, and the New York and Richmond Gas Company.

The booth was designed and constructed under the general direction of R. M. Martin, director of display, Consolidated Gas Company of New York and its affiliated gas and electric companies.

Much interest was shown in the gas industry's booth, and a number of plumbers asked specifically for further details concerning the cooperation given by the gas companies. It was evident that several inquiries were from plumbers who had no conception of the cooperative programs the gas companies are conducting. Many plumbers stated that they would get in touch with their local gas company immediately to get the full benefit of this activity.

Other plumbers, who had already availed themselves of dealer cooperation plans, stated that this program was valuable to them and that they had found it remunerative to work with the gas companies. Those in charge of the gas companies' booth stated that it was evident that the dealer cooperation program is being very favorably received by the plumbing trade.

TECHNICAL SECTION

O. S. HAGERMAN, Chairman H. W. HARTMAN, Secretary C. A. HARRISON, Vice-Chairman

Problems Confronting the Gas Engineer*

C. E. Paige

By CLIFFORD E. PAIGE
Vice-President
The Brooklyn Union Gas Co.

THE most essential quality to success is the power of adjustment." So says the philosopher. The chief problem of the gas business during the last few years has been distinctly one of adjustment. Particularly has this been so in regard to the production engineer and the chemist.

Some of us, at least, can still remember the good old days when the gas works was just a plant for producing gas. The works engineer had to produce only one kind of gas and was concerned principally with the quantity and quality of that product. But that relatively simple operation kept him pretty busy. Even the simple carbonization of coal in retorts brought with it considerations of naphthalene stoppages, tar, coke, and ammonia disposal.

His first great experience in adjustment came in the introduction of carburetted water gas, after which came the combination coal and water gas plant. It was not enough for the engineer to be a good producer; he had to become a good mixer, and he certainly has been a good mixer ever since.

From the days when gas works combined the manufacture of coal gas with water gas, there have been many developments both in equipment and process. The field is not exhausted. As the evolution has progressed, the engineer has been called upon to adapt himself to the use of natural gas. By this time, however, he had become accustomed to quick readjustments. He addressed himself to the assimilation of natural gas and proceeded to reform it.

With this reformation and with the assistance of the oil man, the engineer achieved a refined gas.

In the technical gas manufacturing process, the starting point is found in gas-making materials. The essential, or at least the most widely used raw materials are still coal and oil, but both of these, as far as their inherent characteristics and economic availability are concerned, have changed greatly with the passing of the years.

In the old days, we used to prepare specifications for gas coal and then try to find coal that would meet them. It is now common practice to take whatever coal is available and make the most of it.

The final report of a research conducted jointly by your committee and the United States Bureau of Mines has been completed. This report represents an exhaustive investigation of some thirty American coals and from it, you will learn what may be expected by way of the gas and by-product making qualities of these coals.

As engineers and chemists, you appreciate how vastly more important it is to have an exact knowledge of what these coals actually are than to cherish the hope of what they should be. I have no doubt you will be the first to accord full credit to the important part played by the Bureau of Mines—its organization and splendid scientific personnel—in making these data available.

For enrichment, in the very early days, we used cannel coal; then came naphtha; but for many years, our enrichment has been accomplished largely by what we have called gas oil. "Gas oil," however, as formerly understood, is practically out of the market, and since then, the engineer and the chemist have had to find substitutes,—bunker oil, Texas oil, special oil, and some oils that are not even fluid. Maybe, eventually, the engineer and chemist will have to produce gas from just a slight odor of petroleum, to say nothing of the ultimate conversion of garbage.

The development of processes by which these enriching materials have been made available to us is an epic of accomplishment. Yet like so many other things, having once adopted them, we hurry on to some new conquest, with little time for thought of significance or appreciation for what has already been done.

Better Product Today

You are not concerned entirely with making gas. Competition with other fuels has made necessary the development of gas appliances, largely automatic in operation. By reason of the fine and delicate adjustments necessary to perfect performance, we find that the gas which was good enough for grandfather is not good enough for us.

We are confronted with the gum problem. It is not a simple, one-phase gum problem,—it involves liquid phase gum, vapor phase gum, as well as dust, in many cases. Here you will collaborate with the distribution engineer.

At this Conference, you will hear a paper on this subject by W. H. Fulweiler, chemical engineer of The United Gas Improvement Company. Certainly, the industry is greatly indebted to him and to the entire research organization of that Company. In other years, we have had excellent contributions from the Koppers research organization on this same subject.

Going back further, we again pay tribute to the Bureau of Mines. It was Dr. Ralph L. Brown who conducted, I believe, the first attempt to solve the gum problem through research—at least the first attempt under the auspices of the American Gas Association.

In all these matters, we recognize the inseparability of the production engineer and the chemist. This is clearly indicated by the fact that you hold joint production and chemical conferences. A chemist discovered gas, so there might have been no gas works engineers nor gas plant problems without him. He assumed a heavy responsibility, but we must admit that he has stuck loyally to his job ever since.

I think it was Oscar Wilde who said: "It is only in his voluntary associations that man is really fine." Whatever may be said about our industry,—certainly there is plenty being said—the work of the engineers and chemists of the gas industry will always stand out as shining examples of that quotation.

You have been fine in your devotion to your own duties, fine in your courageous attack on the complicated and never ending problems that confront you, but finest of all in your helpfulness to each other and in your voluntary and notable contributions to the advancement of the whole industry.

Your study and solution of your difficulties have naturally become more specialized and, with the accumulated knowledge of the years, more scientific.

I have mentioned gas mixing. Through the American Gas Association and its Laboratory, you have worked out details of gas mixing and we now have to guide us the various reports of your Mixed Gas Research Committee. It is gratifying to me that one of our own organization, F. C. Weber, has contributed to this work, in association with such outstanding engineers as J. A. Perry, of The United Gas Improvement Company, and many others.

* Address before Joint Production and Chemical Conference, New York City, May 21, 1934.

Joint Production and Chemical Conference in session at New York

When I first heard of the subject assigned me, I realized at once that you did not expect me even to attempt to cover all the ground. What you have done and what you are doing are eloquent contradictions of the saying "There is nothing new under the sun."

I have been asked many times in many years:—"Which is the most important department in a gas company?" The answer obviously is that none could exist without the other. That answer, however, may not quite cover the ground. Certainly in the beginning, all the problems were engineering and technical.

Complex Changes

Competition put promotion into the lime-light. It took years for the industry to shake off the lethargy caused by other years of relatively easy business. Certainly, the most highly technical processes have little value outside the laboratory unless they can be commercialized.

I do not disparage salesmanship. It provided the only possible means by which a business could survive and a service be performed. Our present outlook tends toward law and accountancy. What with new laws constantly being enacted by the Federal, state and municipal governments, we must all, in the interests of customers, employees and stockholders concern ourselves with changes daily more complex.

With all branches of government taking a hand in regulation by accounting practice, we must be alert to regulation becoming confiscation.

I know of no utility person who denies the value of regulation. When regulation becomes hydra-headed and even contradictory, there comes the danger of disruption, if not chaos. When a business is over-regulated, it becomes strangulated.

The utility roster has names which have brought discredit to the business. Propaganda would have you believe that these malefactions are representative and typical of all concerned. This is not so! I do not attempt to pass on the guilt or innocence of individuals. It appears, however, that much of the nasty publicity has been carefully planned for its political effect. There are probably fewer dishonorable people in this business than in any other, because from the start, utility men are brought up in the religion of service. Certain it is that the thousands and thousands of people engaged in the utility business carry on with their appointed tasks, honestly, unaffected by unfair criticism and imbued with a deep sense of a desire to render service.

A sermon might be written on financing and taxes.

These things, not engendered from within, but thrust in from without, have so bothered the business that the technical side of our industry may have felt that it was unappreciated. Thankfully, we find that it has been in the hands of men of ability and could continue indefinitely its contribution to our great enterprise.

A new day is dawning. What it will bring forth cannot be guessed. If one thing is clear, however, in this scientific age, it is that the welfare of the gas industry will more and more devolve upon the experienced technician. It will again be said, though probably not in the same words: "Earnings are made or lost in the retort house."

The problems I have touched upon seem to me to illustrate your code. For, of course, we know that you, as engineers and chemists, had a code long before the recent discovery of ethics by the proponents of the New Deal. I think it can be truly said that you have lived up to that code without the spur of penalty nor the incentive of reward.

I think it has made us all rich,—not rich, possibly, in that currency which has so recently acquired an inherent flexibility in addition to its old quality of slipping through the fingers; rich, rather, in the satisfaction of great problems overcome and in the conviction of having produced something real in the world by the work of our heads and hands; rich, also, in the tribute paid to the engineer by a great educator at our last convention, when he said: "I like to think of the engineer as a practical idealist."

Gentlemen, if we can live up to that tribute, we are rich indeed! For, in my judgment, practical idealism is the hope of the world.

London Gas World Celebrates 50th Anniversary

Reviewing fifty years of progress in the gas industry in England, "The Gas World," London, published its "Jubilee Number," containing 250 pages, on April 28.

This souvenir issue is replete with historical and informative articles. There are contributions from some of the notable figures of the industry, including Sir David Milne-Watson, Sir Francis Goodenough, J. R. W. Alexander, and many others.

Among scores of "Jubilee Greetings" from the "World's" readers is noted one from Alexander Forward, managing director of the American Gas Association. "I am happy to congratulate on the celebration of the Jubilee of 'The Gas World,'" Major Forward wrote. "You have every reason to be proud of the record of your publication in so ably and accurately reporting the progress of the industry during fifty years. . . . . All good wishes to the editors and publishers who have made 'The Gas World' an outstanding piece of journalism in our industry."

TESTING LABORATORY

Approval Requirements Committee to Consider Vital Items

ACTIONS of various approval and listing requirements subcommittees throughout the past few months have brought to culmination many important matters which will receive final consideration by the Approval Requirements Committee at its meeting this month.

Completed listing requirements for relief and automatic gas shut-off valves for water heating systems, domestic gas appliance pressure regulators, water heater, gas range and space heater thermostats, automatic main gas-control valves, automatic devices designed to prevent escape of unburned gas, and semi-rigid gas appliance tubing and fittings will be considered for final adoption. Similarly, extensive revisions to the American Standard Approval Requirements for Gas Water Heaters (Effective July 1, 1934) will be voted on.

Final submission of all the listing requirements for appliance accessories is possible as a result of the April 27 meeting of the Subcommittee on Listing Requirements for Gas, Pressure, and Temperature Control Accessories.

At that meeting the subcommittee considered the material submitted by a special subcommittee formed to function in conjunction with the Testing Laboratory to combine the standards for electric gas-control valves and diaphragm gas valves into a common set of requirements for automatic main gas-control valves, and to revise the capacity and dial calibration tests for space heater thermostats.

Likewise, at the April 27 meeting, all comments received from the industry relative to Tentative Requirements for Automatic Devices Designed to Prevent Escape of Unburned Gas were discussed and the standards modified were considered advisable. All other matters in connection with control accessories had been disposed of at the January 25-26 meeting of the subcommittee.

The tentative requirements for semi-rigid gas appliance tubing and fittings were revised slightly as a result of a letter ballot submitted to the members of the subcommittee concerning criticisms and suggestions received from the industry. These standards are now ready for final adoption by the A.S.A. Sectional Committee.

Revisions to the American Standard Approval Requirements for Gas Water Heaters were prepared at a December, 1933, meeting of the subcommittee, subsequently distributed throughout the industry for comment, and revised at the May 3 meeting. In addition to the criticisms of the industry, the committee also discussed the report of the subgroup on thickness of shells, heads, and bottoms of storage vessels and reports of the Laboratory on such items as large size gas cocks, thermostats, draft hoods, and vacuum relief valves in reference to water heating installations.

The Subcommittee on Approval Requirements for Gas Ranges convened at the Laboratory in Cleveland on May 21 and 22 to consider certain revisions to the American Standard Approval Requirements for Gas Ranges (Effective June 1, 1934). Many of the suggested revisions considered were carried over from previous meetings or from letter ballots submitted to members of the committee in January.

Several reports of investigations conducted by the Laboratory over the past several months were also considered and appropriate revisions and additions made in the requirements as a result thereof.

The completed revisions to the gas range standards will shortly be published and distributed for criticism.

Relationship of Approval and Listing Requirements Defined

EVER since the Laboratory, in December, 1931, began extending its program of equipment certification to include the listing of gas appliance accessories in addition to the approval of complete gas-burning appliances, a clarification of the relationship between the two activities in all their aspects has been needed.

Now that the preparation of the various sets of listing requirements for accessories, such as regulators, thermostats, relief valves, gas burner valves, draft hoods, semi-rigid gas tubing, etc., is practically completed, and such accessories may soon be accepted for test, the Subcommittee on Listing Requirements for Gas, Pressure, and Temperature Control Accessories requested the preparation of a report setting forth the Association's policy regarding the interconnection, significance, and limitations of the accessory listing and appliance approval programs. Such a report was recently prepared by the Laboratory and approved by the subcommittee. This report will be recommended for adoption at the June meeting of the Approval Requirements Committee.

This report explains the meaning of the proposed listing of gas appliance accessories and points out in considerable detail the extent to which listed accessories may be admitted upon approved appliances without further test, and the extent to which listing may be granted to accessories approved as a part of complete appliances. In addition, matters concerning the annual inspection of listed equipment and the degree of correlation that should exist between corresponding requirements for accessories in listing and approval standards, are touched upon.

With the principles set forth in this analysis, the nine sets of listing requirements for gas appliance accessories and appurtenances may be intelligently and helpfully applied to broaden the field of domestic gas equipment certified by the Laboratory as complying with national minimum standards of safety, efficiency, convenience, and substantial and durable construction. The nine types of accessories or attachments for which standards have thus far been drafted include:

Draft hoods, gas burner valves, semi-rigid gas appliance tubing and fittings, gas conversion burners, relief and automatic gas shut-off valves for water heating installations, water heater, gas range, and space heater thermostats, domestic gas appliance pressure regulators, automatic main gas-control valves, and automatic devices to prevent escape of unburned gas.

Gas Helps Build Swift Airplane

Gas played an important part in the construction of the Douglas airplane in which Colonel "Eddie" Rickenbacker broke all coast-to-coast records for transport planes by flying from Glendale, California, to New York in thirteen hours.

In the plant of the Douglas Corporation in Santa Monica, Calif., where the plane was built, gas is used to melt zinc and lead for making dies, to facilitate and speed up several heat-treating and tempering processes in the metal shops, to prepare solutions in the metal plating department, to make paints and "dope" with which airplane fabrics are chemically treated, to maintain correct and uniform temperatures in drying compartments, to do brazing and soldering.

Monthly Summary of Gas Company Statistics

For Month of March, 1934

Issued May, 1934, by the Statistical Department of the American Gas Association
420 Lexington Avenue, New York, N. Y.

PAUL RYAN, Chief Statistician

COMPARATIVE DATA ON THE MANUFACTURED AND NATURAL GAS INDUSTRY FOR THE MONTH OF MARCH

	Month of March			Three Months Ending March 31		
	1934	1933	Per cent Change	1934	1933	Per cent Change
Customers						
Domestic (Including House Heating)	14,599,300	14,425,800	+ 1.2			
Industrial and Commercial	765,600	744,800	+ 2.8	*See March*		
Total	15,364,900	15,170,600	+ 1.3			
Revenue (Dollars)						
Domestic (Including House Heating)	51,627,600	49,810,200	+ 3.6	157,060,100	157,023,700	+ 0.0
Industrial and Commercial	16,937,800	14,116,500	+20.0	50,495,900	44,470,100	+13.6
Total	68,565,400	63,926,700	+ 7.3	207,556,000	201,493,800	+ 3.0

COMPARATIVE DATA ON THE MANUFACTURED GAS INDUSTRY FOR THE MONTH OF MARCH

Customers						
Domestic	9,318,300	9,286,800	+ 0.3			
House Heating	88,400	59,500	+48.6			
Industrial and Commercial	444,700	433,500	+ 2.6	*See March*		
Miscellaneous	9,900	9,600	—			
Total	9,861,300	9,789,400	+ 0.7			
Gas Sales (MCF)						
Domestic	21,200,800	20,913,900	+ 1.4	63,522,900	63,298,300	+ 0.4
House Heating	4,592,300	2,955,300	+55.4	13,987,100	9,123,500	+53.3
Industrial and Commercial	7,848,300	5,943,200	+32.1	22,274,100	18,218,900	+22.3
Miscellaneous	199,900	207,900	—	625,700	610,900	—
Total	33,841,300	30,020,300	+12.7	100,409,800	91,251,600	+10.0
Revenue (Dollars)						
Domestic	25,393,900	25,353,800	+ 0.2	76,248,700	76,872,000	— 0.8
House Heating	2,851,300	2,082,600	+36.9	8,765,100	6,436,000	+36.2
Industrial and Commercial	6,093,700	5,479,700	+11.2	17,800,500	16,758,300	+ 6.2
Miscellaneous	141,800	153,800	—	435,500	438,300	—
Total	34,480,700	33,069,900	+ 4.3	103,249,800	100,504,600	+ 2.7

COMPARATIVE DATA ON THE NATURAL GAS INDUSTRY FOR THE MONTH OF MARCH

Customers						
Domestic (Including House Heating)	5,192,600	5,079,500	+ 2.2			
Commercial	279,300	277,200	+ 0.8			
Industrial	29,800	22,800	+30.7	*See March*		
Miscellaneous	1,900	1,700	—			
Total	5,503,600	5,381,200	+ 2.3			
Gas Sales (MCF)						
Domestic (Including House Heating)	37,878,600	35,229,400	+ 7.5	115,518,500	117,019,900	— 1.3
Commercial	7,189,900	6,262,200	+14.8	21,938,300	21,318,000	+ 2.9
Industrial	45,708,200	34,296,700	+33.3	138,875,500	108,146,900	+28.4
Miscellaneous	1,400,300	771,300	—	3,415,700	2,261,700	—
Total	92,177,000	76,559,600	+20.4	279,748,000	248,746,500	+12.5
Revenue (Dollars)						
Domestic (Including House Heating)	23,382,400	22,373,800	+ 4.5	72,046,300	73,715,700	— 2.3
Commercial	3,135,200	2,824,400	+11.0	9,458,000	9,235,300	+ 2.4
Industrial	7,362,600	5,527,500	+33.2	22,239,600	17,626,500	+26.2
Miscellaneous	204,500	131,100	—	562,300	411,700	—
Total	34,084,700	30,856,800	+10.5	104,306,200	100,989,200	+ 3.3

Gas Revenues Increase 7 Per Cent in March

Revenues of the manufactured and natural gas industry aggregated $68,565,400 in March, 1934, as compared with $63,926,700 in March, 1933, an increase of 7.3 per cent.

The manufactured gas industry reported revenues of $34,480,700 for the month, an increase of 4.3 per cent over the corresponding month a year ago, while revenues of the natural gas industry totalled $34,084,700 or 10.5 per cent more than for March, 1933.

Sales of manufactured gas reported for March amounted to 33,841,300,000 cu.ft., an increase of 12.7 per cent. Natural gas sales for the month were 92,177,000,000 cu.ft., an increase of 20.4 per cent.

Sales of manufactured gas for domestic uses were practically unchanged in March from the preceding year. Sales to industrial-commercial users, however, registered a distinct upturn, manufactured gas companies reporting an increase of more than 32 per cent in this class of business, while for the natural gas companies the gain was 27.3 per cent.

Even larger gains were reported by the manufactured gas companies in sales of gas for house heating purposes, which increased more than 55 per cent from the March, 1933, figure.

For the three months ending March 31, manufactured and natural gas revenues aggregated $207,556,000 an increase of 3 per cent over the first quarter of 1933. Revenues from domestic customers were unchanged for the first quarter. Revenues from industrial and commercial users however increased nearly 14 per cent over the first three months of 1933.

THE RISE OF "GAS HOT TUBES"

(Continued from page 187)

furnaces, enameling furnaces, nitriding, carburizing and similar furnaces immediately presents itself.

While the gas industry is gradually perfecting methods for direct gas firing in one industrial heating process after another, as exemplified in the projects of the Committee on Industrial Gas Research, there are apparently some processes where synthetic and controlled furnace or oven atmospheres are required which cannot be mixed with the products of gas combustion. It is in applications of this kind, as well as all kinds of liquid heating and soft metal melting, that the future of "Gas Hot Tubes" apparently lies.

PENNSYLVANIA GAS ASSOCIATION

(Continued from page 197)

of the American Gas Association, pointed out the increases in production of goods, freight and passenger transportation, and service industry advancement to show that business has turned for the better.

"The gas industry represents approximately one per cent of the nation's annual business," said Mr. Forward, "but I believe that the influence of the gas industry on business as a whole is greater than the apparently small percentage would seem to indicate. That one per cent is probably the most stable increment of the nation's total business. It has varied throughout the economic cycles less than almost any other section of the entire manufacturing and selling structure. Because of small fluctuations it has always had a steadying effect on business equal to several times its dollar value.

"Gas rates have been adjusted so that they should prove increasingly attractive as business improves. Since 1929 there have been many rate adjustments. There have, during that same period, been instituted over 200 rates designed for house heating, making a total of more than 650 such rates in manufactured gas territory.

"The potential uses for gas exceed those of any other form of energy in the home. With the industry thoroughly organized, with old uses for gas modernized, with new uses being made available, and with rates adjusted to attractive levels, I say that gas is prepared to serve in aiding the business upturn and I predict that we will be successful in contributing our part."

New Occupational Hazard Discovered on Coast

AN employee of the San Diego Consolidated Gas & Electric Company, San Diego, Calif., is awarded the palm by *The News Meter*, published by that company, for experiencing an unusual accident. In its department, "Safety News and Notes," *The News Meter* last month said:

"To Phil Pappert, turn-on-off man, goes the prize for the most unusual accident. A buxom Ethiopian Amazon had ordered her gas and electric meters shut off. Evidently under the exhilaration of potent spirits she had forgotten this little detail. As Pappert was standing on an elevation shutting off the electric meter, the ebony frail approached from the rear, clasped him about the knees with her arms and elsewhere with her teeth. After a brief interlude of complete muscular and oral paralysis on Phil's part and of locked gnashers on the part of the dusky dame, she finally unclamped her ivories and lifted Phil's quivering carcass to the ground. Phil stood not on the order of his going, and it's a cinch that he sat not on it, either.

"Here is a new one to list among occupational hazards in the public utility industry."

LETTERS WE LIKE

(From Personnel Service Files)

May 9: "Would appreciate complete data on...." (four key numbers selected).

May 12: "Interested in receiving further details regarding Nos. ...." (four selected).

May 15: "Would like to be informed on names and addresses of the parties identified by the following numbers ...." (six selected).

May 15: "Pleasure of receiving your enclosure of a response from Mr. ..... to my classified advertisement. I thank you very sincerely—I am more than grateful. In giving unemployed men a chance for a job you are performing a work that is as fine as it is altruistic."

May 16: "Complying with request we (Personnel Service) send confidential classification records of men having qualifications you outlined."

May 16: "Thank you for enclosed communication. Have since secured a position, have written Mr..... so he may clear his files of my advertisement and as a distinct courtesy for your friendly cooperation."

Personnel Service

SERVICES OFFERED

Measurement and distribution engineer, speaks Spanish, nine years' design, installation and operation high and low-pressure transportation and distribution natural gas. Now employed in modern coal and water gas production. Specialist in reorganization of meter department and reduction of unaccounted for gas. Prefer Southern-western states or foreign country. Married. **841.**

Young, energetic, technical graduate (B. S. and M. S. in Mech. Engr.) with four years of varied experience with **natural gas** properties: married (29). **843.**

General **manager-engineer** (37) thoroughly experienced in natural gas business from organization, financing, design and construction to production, transmission, distribution, load building and accounting; wholesale and retail. Just completed special services in connection liquidation and reorganization of two properties. **844.**

Experienced **sales manager** with gas appliance manufacturers dealing with utilities or large department stores and furniture trade. Qualified to manage sales department or cover good territory in which there is an opportunity to produce. **846.**

Engineering executive with twenty years of unusually broad technical and practical experience in the management, operation, financial and public relations problems of gas companies, and with especial training in rate development, desires either a permanent connection or a temporary opportunity to handle special problems; qualified consultant and expert witness. **854.**

Manager-gas engineer (46) married. Technical education, twenty years' experience in construction, engineering, manufacture, distribution, finance, management, sales and public relations; wide experience. Build up property or develop sales per year per customer, small or large property. **858.**

Gas engineer (34) technical graduate, with several years' broad experience with affiliated holding and operating companies in high and low pressure distribution, coal and water gas manufacture, natural and refinery gas, design and installation of distribution and transmission systems; specialist with excellent record of results in mitigation of unaccounted for gas. **859.**

Utilization sales engineer (39) with unusually broad experience in employ of gas companies and equipment manufacturers service. Technical graduate and thoroughly well qualified for domestic commercial and industrial sales or research. **861.**

Manufacturers representative with many years' experience and with headquarters and staff in New York City, covering Eastern territory, will be glad to represent another non-competing manufacturer, preferably industrial specialties. **862.**

An honest, steady, well-educated, thoroughly trained gas man desires a connection where his fifteen years of varied experience can be used. He has served in plant and distribution operation, as **district manager,** headed gas department of combination company; understands safety work and has devoted considerable study to rate making. **864.**

Manager—Formerly executive in operating charge for corporation having numerous gas properties. Has held management positions both large and small cities. Experience as executive foreign operations and engineering for holding companies. Thorough knowledge of gas business including operation, rates, merchandising and public relations. Excellent education and record. Age fifty. **865.**

SERVICES OFFERED

Advertising, Publicity, New Business or Personnel. University Graduate, one year with a New York newspaper, some merchandising experience with a large department store and two and a half years with a gas company doing **sales** promotional work and editing the company paper. **866.**

Combination Gas and Electric **Utility** man. Expert on meters, experienced Superintendent of distribution, practical engineer. Age 36, speaks English and Spanish. Will go anywhere. **867.**

Sales position by man having a number of years' experience in both Industrial and Domestic gas appliance sales and installation work with utility companies. Familiar with natural gas conditions and requirements. **868.**

Manufacturers agent, graduate engineer, many years' sales experience and unusually wide acquaintance with executives of gas companies, wholesale plumbers and jobbers. Covers eastern territory headquarters in New York City. Excellent sales record and wants an additional non-competing line of interest to present clientele. **869.**

Technical **Engineer,** with several years' experience in each of following—Operation, Management, Valuations, Gas Engineering, and Sales Engineering. **870.**

Manager. Due to a consolidation of Gas and Electric properties, a Manager is seeking a change. One with wide practical experience and who has been successful. **871.**

Engineering graduate with several years' varied experience in the design, manufacture, erection and operation of gas plant equipment, and in supervision of plant operation, desires **supervisory** or technical position with small gas company in any locality. Married. **872.**

Fourteen years' experience in testing, design and manufacture of gas appliances and controls. Thoroughly familiar with service conditions on all types of gas by personal experience in national laboratory and in the field. Desire permanent or consulting connection with manufacturer, or with gas company in **utilization** and **sales.** **873.**

Gas engineer who has had 3½ years' experience in general operating department of public utility. Past 18 months assistant to superintendent of manufacture, in the production of coal and water gas. Graduate E. E. Age 26. Single. **874.**

Gas engineer technical graduate. Fourteen years' experience in water gas production, distribution, engineering and construction. Design, installation and operation of medium and low pressure distribution systems and high pressure transmission lines. Experienced in heavy oil operation and can produce low production costs. **875.**

Sales representative with eighteen years' experience, eight years selling, desires position to specialize in the sale of automatic gas water heaters, gas refrigeration, or hotel equipment, gas company or manufacturer; will go anywhere, have own car. Married, age 38. **876.**

Gas engineer, technical graduate, N. Y. State Engr. License, post-graduate work in utility economics and accounting. Six years broad practical experience covering manufacture of oven, retort, and water gas—utilization—construction—customer's service—and high and low pressure distribution. Desire an executive position with small company. Will go anywhere. Married. (28). **877.**

SERVICES OFFERED

Industrial gas sales engineer, six years' experience, large Eastern combination company. Broad experience in sales, installation and service of varied industrial applications as, bake ovens, boilers, furnaces, etc. Familiar with all competitive fuels, preparation of estimates and cost surveys, and economical rate determinations. University graduate, 34, married. **878.**

Experienced and proven **sales manager** and salesman, who has successfully established steady, volume sales to Eastern and mid-western gas companies, wants to act as distributor in these territories for one or two quality lines of reliable manufacturers. Particularly for appliances, engineering specialties or gas distribution materials. **879.**

Experienced man, thorough knowledge installation and operation of **Property Accounting** methods constituting perpetual inventory. Familiar with requirements Uniform System of Accounts ré fixed capital in utility property in New York, well versed in special reports, exhibits and statistical compilation for rate making or other purposes. **880.**

Sales engineer (36) married; two years erection and sales for large manufacturer industrial furnaces; four years supervisor of industrial, commercial and house heating for large eastern utility company and four years with world's largest air conditioning manufacturer, invites correspondence and investigation of gas company officials desirous of obtaining new business. **881.**

Manufacturer's distributor, gas ranges and appliances, New Jersey, New York and Pennsylvania; wide experience in sales among utilities, leading department stores, stove jobbers, plumbers, and builders. **882.**

Manager, superintendent or **engineer** with unusually varied experience in operating and management covering coal, water and oil gas. Reforming of natural gas. Mixed and straight natural gas distribution changeover. Aggressive. **883.**

POSITIONS OPEN

Manufacturer of well-known burner successfully used for domestic house heating and industrial purposes is desirous of obtaining **manufacturer's agents** in the greater portion of the country except the New England states. Prefer man with gas utilization in all fields including house heating. **0269.**

Gas Appliance **Salesman** wanted. Progressive, established manufacturer of radiant and circulating heaters wants experienced representatives for Texas. One having both dealer and utility experience preferred. Commission basis, with possibility of drawing account. State age, experience, full qualifications. Unusual opportunity. **0270.**

Manufacturer's Agent representing important Industrial Gas Appliance Manufacturer has a proposition concerning available territory in Western part of New York State. Straight commission basis. **0271.**

Three high type **salesmen** for largest gas appliance store in large southern city; 12 per cent commission paid on all gas appliances sold. **0272.**

Manufacturers agent, with gas company and plumbing jobber clientele, to sell complete line of automatic water heaters manufactured by nationally known company in the Eastern New England territory. **0273.**

Advisory Council

E. R. ACKER.....Poughkeepsie, N. Y.
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